

ID2.1 Initial Requirements Report

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Building the European Network for Lifelong Competence Development

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ID2.1 Initial Requirements Report

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RE	Restricted to a group specified by the consortium (including the Commission	
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Project Internal Deliverable Report

ID2.1 – Initial Requirements Report

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Contributors	Francisco Javier Arenales (Altran SDB), Miguel Arjona Villanueva (Altran SDB), Eleni Boursinou (INSEAD), Christian Glahn (OUNL), Eelco Herder (UHANN), Pythagoras Karampiperis (CERTH/ITI), Arne Koesling (UHANN), Ruud Lemmers (LOGICACMG), Marco Luccini (ILABS), Jocelyn Manderveld (SURF), Carlos Méndez (Altran SDB), Ayman Moghnieh (FBM-UPF), Naiara Sacristán (Altran SDB), Antonio Sánchez (Altran SDB), Judith Schoonenboom (UvA), Henk Sligte (UvA), Marcus Specht (OUNL), Panagiotis Zervas (CERTH/ITI)		
Authors (Partner)	Altran SDB (Miguel Arjona, Carlos Méndez, Naiara Sacristán, Antonio Sánchez)		
Contact Person	Miguel Arjona		
WP/Task responsible	Miguel Arjona		
EC Project Officer	Mr. M. Májek		
Abstract (for dissemination)	<p>This internal deliverable contains two main parts:</p> <ol style="list-style-type: none"> 1. Functional Requirements for the TENCompetence integrated system (which includes the descriptions of the high level use cases and the main components of the system) 2. Non Functional Requirements for the TENCompetence integrated system 		
Keywords List	Functional requirements, Non Functional requirements, Actor, Component, Use Case		

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01-02-2007	2.0	Final Draft Complete (only minor revisions to be implemented)	Miguel Arjona, Carlos Méndez, Naiara Sacristán

NB: Personal pronouns in this document are meant to be gender-inclusive. In most cases he/she and his/her are used for reference. In those cases in which either the female or the male pronouns are used, this should be read as referring to persons of both sexes.

1 Executive Summary

The main objective of this report is to define the overall functional and non-functional requirements of the TENCompetence Integrated System using brief and clear descriptions.

The process of defining the requirements is conducted in three phases or cycles thus allowing refinement the requirements during the whole project lifecycle in an iterative and incremental way.

These three cycles are:

- Cycle 1: elaboration
- Cycle 2: construction
- Cycle 3: transition

This project internal deliverable report is the Initial Requirements Report based on the first elaboration phase.

The **Functional Requirements** section contains:

- Definition of Main Actors in the System.
- Definition of elements and dimensions of External Systems.
- Main Components of the system (Network of Learning, Competence Development Programmes, Unit of Learning and Knowledge Resources) described in detail using UML diagrams.
- Use Case Model describing the six main-users' Motivations for using TENCompetence using narratives and UML diagrams. These six main-users' motivations and the related Use Cases are:
 - Explore Learning Networks (5.1.1 Explore a Learning Network)
 - Improve their proficiency level. (5.1.2 Improve their proficiency level)
 - Keep up to date. (5.1.3 Keep up to date)
 - Locate functions or Jobs they could perform with their competences (5.1.4 Reflect on Competences)
 - Study for a new function or job (5.1.5 Study for a new function or job)
 - Look for support (5.1.6 Want some support)
- Pilot scenarios described with narratives and UML diagrams.

The **Non-Functional Requirements** section contains the initial set of non-Functional Requirements based on the IEEE-STD-830-1998 'Recommended Practice for Software Requirements Specifications'. The initial Non-Functional requirements include requirements with regard to:

- Functionality
- Usability
- Reliability
- Performance
- Supportability
- Design Constrains
- On-line User Documentation and Help System Requirements
- Purchased Components.
- Interfaces
- Licensing Requirements

- Legal, Copyright and Other Notices
- Applicable Standards.

The report ends with a glossary of the most relevant and important terms. This Glossary creates a common background for the project, which is one of the main objectives of the “WP2- Requirements & Analysis of the Integrated System” in this first project cycle.

2 Introduction – WP2 within TENCompetence

The aim of the TENCompetence project is to develop an infrastructure for lifelong competence development. To this end, four work packages (the so-called ‘Aspect work packages’) within TENCompetence are devoted to the elaboration of one of the four core aspects of competence development:

- 1) Knowledge Resource Sharing & Management (WP5)
- 2) Learning Activities and Units of Learning (WP6)
- 3) Competence Development Programmes (WP7)
- 4) Networks for Lifelong Competence Development (WP8).

The core outcomes of these work packages are models, methods and tools.

Three other work packages are devoted to the integration of the outcomes of the four aspect work packages by developing and validating an integrated model and infrastructure for competence development; these are called ‘integration work packages’. Work package 2 ‘Requirements & analysis of the integrated system’ is one of these. The other two are WP3 on Technical design & Implementation of the Integrated System and WP4 on Validation of and Pilots with the Integrated System. Within WP2, the emphasis is on overall integration of the first two core workflows of the Unified Process: Requirements and Analysis.

Because of its overall integrative function, WP2 integrates as well as steers the activities of the Aspect work packages. Besides, WP2 affects the other two integration work packages. The ongoing work in WP 4 (Pilots) will be coordinated with work in WP2, translating the plans and scenarios of the pilots into use cases and a conceptual framework, all in relation to the theories underpinning the project. The evaluation plan will also be translated into user needs and requirements for the system. Work will also be closely coordinated with WP3.

In the first 18 months the focus is on the definition of the enabling structure and systems for the first integrated pilots. Its objectives for the first 18 months of the project are:

1. Define the requirements of the Integrated System in terms of a Use Case Model.
2. Define the non-functional requirements for the Integrated System.
3. Analyse the requirements & select and use underlying theories, models & methods used in the project to model the conceptual structure of, and processes in the integrated system (in terms of a Domain Model).
4. Create an integrated roadmap for further development and refinement of the functional requirements and integrated pilots for the next 18-month periods of the project.

This document describes the outcomes of task 1 and 2, the definition of the requirements. Basically, the initial requirements described in this document are those requirements that need to be fulfilled for a successful realisation of the seven objectives of the TENCompetence project, which are to research and develop:

- 1) New, promising, innovative pedagogical approaches for lifelong competence development, supported by the TENCompetence infrastructure.
- 2) Tools to support individuals, groups and organisations in Europe to find the best solution for their formal or informal learning problem.
- 3) Policies and software agents that support the pro-active sharing of knowledge and learning resources.
- 4) Models and software tools to assess the competences of individuals, groups and organisations in an exchangeable way.
- 5) Software for the effective and efficient support of users who create, store, use and exchange knowledge resources, learning activities, units of learning, competence development programmes and networks for lifelong competence development.
- 6) Software solutions to establish a decentralized, self-organized and empowered management model when using the TENCompetence infrastructure.
- 7) Integration of isolated tools that are available in the field.

The structure of this document is as follows.

In section 4, Definitions are provided, starting with the definition of main actors of the system, external systems and main components.

Section 5 describes the Functional Requirements. In section 5.1, the definition of the Use Case Model starts with detailed descriptions of six high level use-cases that describe the main users' motivation for accessing TENCompetence, that is: to explore a learning network, to improve their proficiency level, to keep up to date, to reflect on their competences, to study for a new function or a new job, or to want some support for some specific action like exploring a Learning Network or in locating functions or jobs which he/she could perform considering the level the learner has reached with regard to his/her competences. The narratives of these main use-cases are then completed with a UML model. In section 5.2, the main TENCompetence components (Network of Learning, Competence Development Programmes, Unit of Learning and Knowledge Resources) are described and detailed descriptions of their subsystems are included. Subsequently related use-cases are modelled in UML diagrams. Functional Requirements are completed in section 5.3 with additional use-cases describing pilots scenarios including both narratives and UML diagrams.

Section 6 describes the initial set of Non-Functional Requirements collected through different questionnaires sent to project partners. It is important to highlight that only generic non-functional requirements can be collected at this stage of the project, as most of the technical work is only just beginning. After having a clear and overall vision of the functional requirements and the pilot architecture, more specific non-functional ones can arise. Anyway, current non-functional requirements have been incorporated following the structure recommended by UP (Unified Process) that is based on the IEEE-STD-830-1998 'Recommended Practice for Software Requirements Specifications'¹.

¹ http://www.techstreet.com/cgi-bin/detail?product_id=14024

The report ends with section 7 in which a glossary of terms of special importance for the project towards creating a common ground, one of the main objectives of the “WP2-Requirements & Analysis of the Integrated System” in this first project cycle.

This document forms important input for the work of WP3 (Technical Design and Implementation of the Integrated System) in the second cycle of the TENCompetence project.

The use of the different sections by WP3 is as follows:

1. The overview of the system's main functionality, given in the High Level Use Cases, will be used to create an interaction design. The interaction design shows the layout of the screens and their flow, and thus guides the visual development.
2. The Main Components show which parts will be realised by the aspect work packages. It informs WP3 both which components need to be integrated later into the system and which components don't need to be built by WP3. Together with the High Level Use Cases, this section determines the functional scope of the system that WP3 will build.
3. WP3 will use the Non-Functional Requirements to determine the boundaries (performance, legal, etc.) within which the integrated system has to work. These boundaries are important for WP3 to create a suitable architecture.

3 Methodology

The formulation of requirements and the analysis of the system are critical for the functional integration of the outcomes of the project, as it deals with the first two core workflows of the Unified Process² used in the project: Requirements and Analysis. These two steps are repeated in the three cycles of the project:

- Cycle 1: Project life cycle objectives and an architectural proof of concept.
- Cycle 2: Initial operational capability in the form of a working technical infrastructure demonstrated in various real-life usability pilots.
- Cycle 3: Product release in the form of various business case demonstrators supported by the future TENCompetence support network.

The main objectives of this activity are:

1. To define the overall requirements of the Integrated System in terms of a Use Case Model, to define the first integrated system and to steer the RTD (Research, Technology and Development) activities in the project (relates to all main RTD integration problems specified in table I).
2. Define the non-functional requirements of the Integrated System based on the IEEE-STD-830-1998 ‘Recommended Practice for Software Requirements Specifications’.
3. To analyse the requirements to create a Domain Model that defines the conceptual framework.
4. To create a concise and common understanding of TENCompetence concepts and the outcomes of the project among the partnership. Among other things, this will be reflected in a joint agreed-upon roadmap for future RTD activities.

3.1 Functional Requirements

The Unified Process used in the project starts with the capturing of user requirements in a Use Case Model that describes the typical interactions that a user has with the system in order to achieve a goal. Each use case indicates a function of the TENCompetence infrastructure that the user can understand. These Use Cases are described using UML diagrams and narratives.

All the relevant scenarios and use cases for the system have to be identified, described and prioritized. The input for use cases and scenarios are provided by the potential users of TENCompetence.

Different instruments will be used to acquire input from the users: interviews, surveys and focussed workshops. For critical functional aspects small prototypes or simulations will be built to access the feasibility or to sharpen the requirements of the users on the aspect. Also the pilot activities will input important scenarios and use cases to the project.

² The RUP (Rational Unified Process) is a software development approach that is iterative, architecture-centric, and use-case-driven. RUP is not a single concrete prescriptive process, but rather an adaptable process framework, intended to be tailored by the development organizations and software project teams that will select the elements of the process that are appropriate for their needs.

The requirements defined in this activity include the analysis of the requirements for the four RTD aspects, and consequently this will be an important input for the aspect RTD. It is important to highlight that this is a recursive process and requirements are improved during the three cycles of the project.

The first version of the requirement contained in this document will be depurated during the Gap Analysis we will perform as next step in the process as part of Cycle 1 and other activities in next cycles.

3.2 Non-functional requirements

In addition to the functional user requirements that are captured in the Use Case Model, the project will also define the non-functional requirements of the system. These non-Functional Requirements have been collected through different questionnaires sent to project partners based on initial set of non-Functional Requirements from the IEEE-STD-830-1998 'Recommended Practice for Software Requirements Specifications' that includes requirements about:

- Functionality
- Usability
- Reliability
- Performance
- Supportability
- Design Constraints
- On-line User Documentation and Help System Requirements
- Purchased Components.
- Interfaces
- Licensing Requirements
- Legal, Copyright and Other Notices
- Applicable Standards.

These requirements will not be expressed in technical terms (that is a task for the technical design & implementation activity), but in descriptive terms, specifying the evaluation criteria for the non-functional requirements that will be tested in the pilots and validation activity.

We have to have in mind that only generic non-functional requirements can be collected at this stage of the project, as most of the technical work is just only beginning and considering that only after having a clear and overall vision of the functional requirements and the pilot architecture, more specific non-functional ones can arise.

3.3 Domain Model

Use Cases and non-functional requirements do not provide the whole picture of the Integrated System. Another important activity is to develop a conceptual model of the domain (Domain Model). The conceptual domain model has to answer questions like:

- What do terms like 'competence' and 'learning activities' mean?
- How do they fit together?

The Domain Model answers these questions, and at the same time, lays the foundation for the object model that will be used to represent the objects in the system later in the process.

3.4 Roadmap and Common Ground

The creation of a detailed and concise common understanding of the outcomes of the project among the partnership is the first to be addressed by the project.

Experience in EU projects has shown that this is one of the critical success factors for the integrated project. This common ground is established by involving all partners in the definition of the Use Case Model, the Non-functional requirements and the Domain Model.

The following questions need to be answered:

- Which use cases will be supported by the integrated network infrastructure to be developed?
- What are the main theories, models, methods and technologies needed for the TENCompetence infrastructure in general, and for the pilot specifically?
- How do we measure the validity of the theories, models, methods and technologies in the pilot?

Answering these questions is not a linear process:

1. it integrates the evolving knowledge and technologies that partners bring into the project,
2. it integrates the evolving business interests of the partners in the project,
3. partners learn about new fields, networks and technologies brought in by other partners,
4. when the theories, models, methods and technologies are identified these steer the further development and research in the RTD work packages.

Consequently an iterative process has been defined, with each iteration moving forward towards the WP objectives, but also enabling partners to provide new input. This structure is not rigid, and it may be possible or desirable to accelerate the process for certain areas if there is clear agreement among the partners. This flexibility is formalised in the assessment internal deliverables.

This common ground will be established by involving all partners, and also associated partners, in the definition of the detailed requirements (Use Case Model), and conceptual framework (Domain Model) for the project. The major result will be a joint agreed-upon roadmap for further RTD work in the field of lifelong competence development. The roadmap will be used to create further, grounded insights in the future activities in the design and validation field. These roadmaps are also created in the Aspects RTD activities. These will be integrated into one overall roadmap (the 'integrated roadmap').

A website (e.g. including a wiki) will be set-up for the partnership to discuss and retrieve the current status of the use cases, definitions, theories, models and technologies that are defined and used in the project.

3.5 Results and Assessment Indicators

At the end of each cycle there will be updated reports on the requirements and analysis of the integrated system. This will include: the versions of the Use Case Model, the Non-functional requirements and the Domain Model.

Furthermore the integrated roadmap will be provided. Overall success of the requirements and analysis activity will be measured through the results of the pilots with the Integrated System.

4 Definitions

This section defines the main components of the infrastructure that is to be developed by the TENCompetence project, or, as we will call it henceforth, ‘the system’. A description of components of the system is needed, as the requirements on the infrastructure will refer to these components. First, section 4.1 describes the acronyms that are used in this document.

The system consists of two types of elements: human and non-human elements. The human elements, called Actors, define the several roles that people can perform in the system. These roles are defined in section 4.2. The non-human elements, called Main Components, define the kind of things that the Actors find in the system. These things are described in section 4.3. Finally, section 4.4 describes the relevant components of the external system. These are human and non-human elements that are outside the system, they are not a part of the system, but they are relevant to the system. They are part of the surrounding context with which the system interacts.

4.1 Acronyms

The following acronyms are used in the rest of this document.

CDP	Competence Develop Programme
GUI	Graphical User Interface
KR	Knowledge Resources
KRSM	TENCompetence Knowledge Resources Sharing and Management
LA	Learning Activity
LN	Learning Network
RTD	Research, Technology and Development
TENC	TENCompetence
TENCC	TENCompetence Client
TENC GUI	TENCompetence Graphical User Interface
TUI	Tangible User Interface
UC	Use Case
UI	User Interface
UOL	Unit of Learning

4.2 Actors

An actor is the general user of the TENCompetence system. An actor is a person, a team of persons or a formal or informal organisation. An actor can have various roles in the learning network that can change according to the policies, but in principle each actor can have the right to perform any task in the system. This means that a person can have the role of learner and of teacher or assessor. The actor role should be only used when it is not possible to associate a certain use case to one of the other roles.

The major roles for an actor are:

- learner
- facilitator (eg teacher, tutor, mentor, peer tutor, etc.)
- assessor
- author

4.2.1 Learner

Learners have goals (e.g. they want to improve a competence). After selection of a specific action, they perform the action. When there is no adequate action available they can make the goal 'pending'. Other actors (in the role of author) can provide an adequate action. The learner stereotype represents those persons who use the TENCompetence infrastructure in order to follow a pedagogical path. Motivation for these activities could be:

- Improve proficiency level
- Keep up to date
- Study for new function or job
- Want for support
- Want to know something

Learners will use the system to extend their knowledge and skills. Their learning activities can be part of both formal and informal learning.

4.2.2 Author

An author is anybody who creates knowledge resources, activity specifications or entire curricula. Authors edit the learning network, the actions within the network, the competence map, the topics and the knowledge resources. An author can belong to the following categories:

4.2.2.1 Content creator

A content creator is someone who creates and edits 'raw' resources, like Word and HTML files. (e.g. graphic artist, editor)

4.2.2.2 Course designer

A course designer is someone who creates courses. They may be interested in using the TENCompetence system in order to look for suitable content, i.e. resources, for planning an e-learning course.

4.2.2.3 Administrator

An administrator performs activities addressed to the correct functioning of the TENCompetence system itself, and other ones related to the Permission rights over resources and Users' access rights. Administrators are also appointed to handle the 'visibility' and listing of the repositories in the system.

4.2.2.4 Instructional designer

An instructional designer is someone who creates learning objects, lessons, etc. Through the TENCompetence system he/she can look for the resources needed for building these. Moreover, an instructional designer may collaborate with content creators for the production of suitable content.

4.2.2.5 Teacher / tutor

Teachers and Tutors use the system to help Learners in their learning process. Teachers will normally play a bigger role than Tutors in creating learning objects and lessons.

Teacher: A teacher may use the TENCompetence system for looking for resources for planning a course or improving an existing one. Of course, a teacher may be helped by a Course designer, an Instructional designer, a Content creator, too.

Tutor: Like a teacher, the Tutor may need the use of the TENCompetence system for looking for additional or specific resources that, for instance, can help and/or complement some topics in an e-learning course.

4.2.3 Assessor

An assessor is a person that is legally entitled for accreditation of the learning outcomes of a learner. An assessor can be involved in the competence assessment, an assessment activity or the unit of assessment. The role of assessor can be fulfilled by any actor (also the person himself, eg. self-assessment) dependent on how formal the assessment must be.

4.2.4 Facilitator

A facilitator is a person who supports learners in their learning process. Facilitators will answer questions that learners have posted for other actors to answer.

This can be:

- Expert
- Teacher
- Tutor
- Mentor
- Moderator
- Peer support
- Trainer

4.3 Main Components

4.3.1 Learning Networks

A learning network is an ensemble of actors, learning resources (actions & knowledge resources) and competence maps which are mutually connected through and supported by information and communication technologies to support lifelong competence development. This characterisation, however, fails to explain how learning networks may contribute to the effectiveness, efficiency or even attractiveness of learning. From the perspective of our work package such a contribution can best be made by strengthening the social ties within a (learning) community. Put differently, reshaping a learning network as a community enhances the quality of the members' learning experience. How this may best be achieved is the focus of WP8.

4.3.2 Competence Development Programmes

We define Competence Development Programmes (CDP; synonyms: route, learning path, curriculum, programme) as formal, non-formal, or informal collections of learning activities and units of learning, which are used to build competence in a certain discipline or job. The learning activities and units of learning are relatively independent from each other – as compared to a unit of learning, which is a tight integration of learning activities. Depending on the competencies to be built, these programmes can be small or quite extensive.

These programmes may include formal programmes offered by institutions, such as predefined curricula. We envisage that many competence development programmes will be rather non-formal in nature, such as learning material that is freely accessible but without any formal planning or evaluation. The benefit of this kind of non-formal learning is that a learner can better align his learning efforts with his natural work flow. Even more integrated into the work process would be the informal learning processes that take place on the work floor, such as peers exchanging knowledge with one another or making use of reference material or online help systems.

Most standard curricula are designed in a rather static manner, serving a particular type of learners with a predefined goal. Some 'personalization' can be achieved by granting exemptions for certain parts of the curriculum, or by having a part of the curriculum to be filled in with a selection of optional courses. However, this approach is insufficient for creating targeted, relatively short, 'just in time' CDPs for learners with various backgrounds and various specific learning needs. A more flexible approach would be to create a learning programme 'on the fly' by assembling a collection of learning units that together constitute a coherent programme. It might well be the case that several alternative collections of learning units may be used for achieving the same goal.

4.3.3 Unit of Learning and Learning Activities

Learning activities are the designed or performed activities of a person that are directed at the attainment of a (explicit or implicit) learning objective. Designed learning activities are called 'units of learning' (UoLs), such as courses, workshops, lessons, etc. A unit of learning adds a 'learning design' to the knowledge resources; they add pedagogical aids like study tasks, tutoring, mentoring, monitoring communication services, feed-

back, formative and summative assessments. Units of Learning are formally modelled and interchanged using the IMS Learning Design specification.

4.3.4 Knowledge Resources

According to the TENCompetence Domain Model, a Knowledge Resource³ can be defined as follows:

“Knowledge resources are any kind of resources that can be used in learning. Typical resources are:

- a. HTML pages
- b. Podcasts / Vodcasts
- c. digital documents
- d. computer programmes
- e. etc.

Knowledge resources have a URL as identifier. They can be searched at the level of the learning network or by browsing the topics, and they can be grouped using specifications like SCORM.”

4.4 External Systems

External Systems consist of human and non-human elements that are outside the system. Thus, they are not a part of the system, but they interact with the TENCompetence environment in order to provide a specific service. Together they form the total infrastructure.

4.4.1 Portfolio

The portfolio is not a separate entity in the system, but a view on the data in the system for different purposes, e.g.:

- to reflect on one’s accomplishments
- to make a profile that can be published to the LN
- to make a profile (a CV) that can be published to a specific group (e.g. an employer).

These views can be printed and exported (to be used in another ePortfolio system) in a standard format like IMS ePortfolio.

The data that are typically of interest in an ePortfolio view are:

- stopped not completed actions
- completed actions
- results of completed actions
- results of the competence assessments of completed
- actions (evidence for having attained a competence in the learning network)
- data stamps for all data (order of completion can be derived from this for track analysis).
- rating scores

³ For our purposes Knowledge Resources can be also defined as resources that can be handled by the KRSM system: from raw resources (e.g. images, texts, audio files, videos, animations) to complex ones such as LOs, UoLs, Learning Activities, courses etc. In the use cases here referred to, the terms and expressions ‘resource’ and ‘knowledge resource’ are synonyms.

- actions on resources and services (within an action).

Furthermore the portfolio also contains identity information and personal profiles. The actor can make selections of this information available for others to view (and so creating multiple identities). Import of portfolio data will be supported later. Historical data can also be entered manually in the portfolio view (e.g. previous acquired competence levels and products and diplomas/certificates (as a proof for the proficiency levels).

When the portfolio does not contain a proficiency level for the actor on a competence, the actor is asked to estimate the proficiency level according to a given scale.

The actor can correct the proficiency level manually, depending on the rights management. E.g., in formalised competence maps & assessments.

4.4.2 Positioning service

Positioning is the process of mapping learner characteristics – as received by an e-portfolio or by a personal competence development plan – onto learning programmes, which consist of learning units in a learning network. The positioning service uses the registered actions-results in the portfolio to estimate for an actor the initial proficiency levels of each competence defined in the competence map (independent of any roles). This is for instance done when a new person (with a non-empty portfolio) enters the system and wants to know his position on the competence map. This can be used for navigational purposes. In the future the positioning service can also be asked to provide the competence levels based on an analysis of the portfolio of the learner and eventually provide the proficiency levels of the learners that belong to the same topic.

4.4.3 Notification service

The notification service helps the actor to notify various events. This service is the responsible to send information as Newsletters, Schedules, updates to the different actors involved in the systems using different ways – such as e-mail or SMS

Examples:

- Email service to get updated on changes in specific areas in the LN
- SMS when someone has answered a pending question

4.4.4 Authoring tools

An Authoring Tool is any editing tool that is able to edit / modify / aggregate raw and complex resources. The result of the editing / authoring activity is another raw or complex resource. The authoring/editing functions that are connected to the design and development of any resource that has to be developed in the system by any actor (also learners have access to the authoring features).

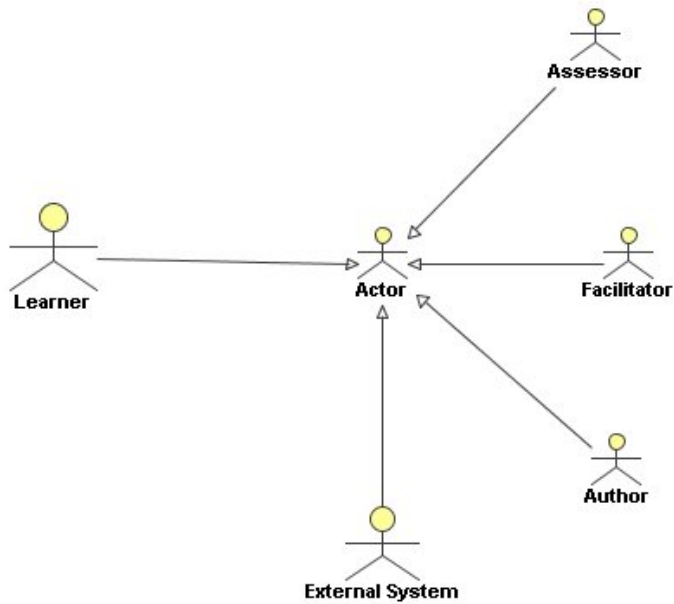
4.4.5 Authoring tools repository

The repository supports the finding of the Authoring tools that are launched via the KRSM system. Typically this repository is located into the User's (i.e. Author's) local machine. However, there could be also some online Authoring tools that can be invoked (e.g. Google docs & Spreadsheets).

Since this is totally transparent to the User, this External System could be loosely assimilated just to the area of the TENCompetence GUI where it is possible to access it.

4.4.6 Knowledge resources repository

Such repositories are the ones where the knowledge resources are sought. Therefore, depending on the KRSM system implementation, could be e.g. local file system, P2P shared repository, remote federated and distributed repositories.



5 Functional Requirements

5.1 High Level Use Cases

This section describes six high level use-cases that describe the main users' motivation for accessing TENCompetence, that is: to explore a learning network, to improve their proficiency level, to keep up to date, to reflect on their competences, to study for a new function or a new job, or to want some support for some specific action like exploring a Learning Network or in locating functions or jobs which he/she could perform considering the level the learner has reached with regard to his/her competences. The narratives of these main use-cases are completed with a UML model.

5.1.1 Explore a Learning Network

This use case has one actor:

- Learner

Prerequisites:

- The Learner must be connected to the system
- The Learner has subscribed/Selected a learning network before subscribing an action.

The learner's motivation is to explore a Learning Network looking for topics, actions, issues, etc., that suits his/her aspirations and/or wants.

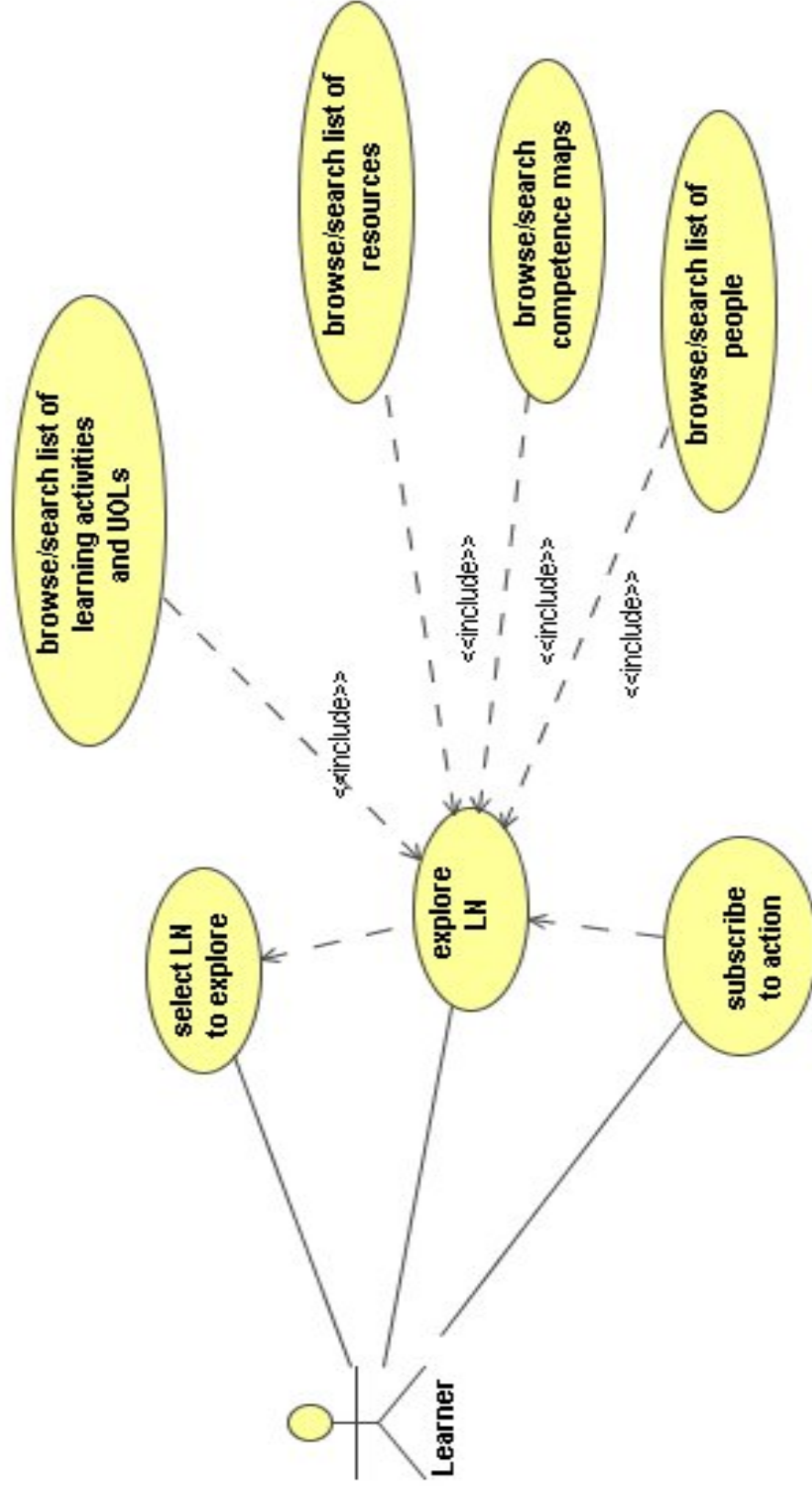
The users will receive the list of Learning Networks which they are subscribed to, every time they log-in the system. If they are not subscribed to any Learning Network, they will have the opportunity to select the issues and topics they are interested in and they will receive a full list of relevant Learning Networks. The system can also propose some topics according the current context or previous behaviour of the learner.

Once the learner has found a Learning Network with the issues or people with the matters of his/her interested, he can select it and explore the contents.

After the learner has selected a Learning Network of his/her interest, he can browse and search for Learning Activities, Units of learning, resources, competence maps, and people.

Once the learner has enough knowledge about a specific Learning Network and its possible actions, he/she decides what kind of action he/she will subscribe. He/she will be able to subscribe different actions from a list of available actions (suitable CDPs, Learning activities and Units of Learning).

MAIN USE CASES	SHORT DESCRIPTION
Select LN to explore	If the user has find the LN he/she is interested in, it can be selected to explore it
Explore LN	Once selected the LN, its contents can be explored
Subscribe to action	From a list of actions of a LN, the Learner can subscribe to a number of them.



5.1.2 Improve Proficiency Level

This use case has one actor:

- Learner

And two external systems:

- Portfolio (External System)
- Positioning Service (External System)

Prerequisites:

- The Learner must be connected to the system
- The Learner has subscribed/Selected a learning network before subscribing an action.

The main user-stereotype is the learner. The learner's motivation in this use case is to improve his/her proficiency level for a specific competence.

Each learner has different types of competences which are reflected on his/her ePortfolio, together with the level of each one. The level of these competences can be modified when the learner improves the proficiency level or acquires new knowledge related to them. To achieve this, the system will position the learner into the system according to his/her ePortfolio, in the competence that best suits his/her actual proficiencies and levels.

Moreover, the learner can express his/her interest on acquire new competences not reflected on his/her ePortfolio. To achieve this, he/she will be able to search topics, issues, etc. in the system. The search output will show all available competence maps that fits with his/her new wishes and demands.

The competences that the learner can select to improve can be of two types:

1. competences he/she already had, in this case it can be selected viewing his/her personal competences through the information reflected on his/her ePortfolio.
2. new competences, which can be select from the list of competence maps that has been shown to the learner.

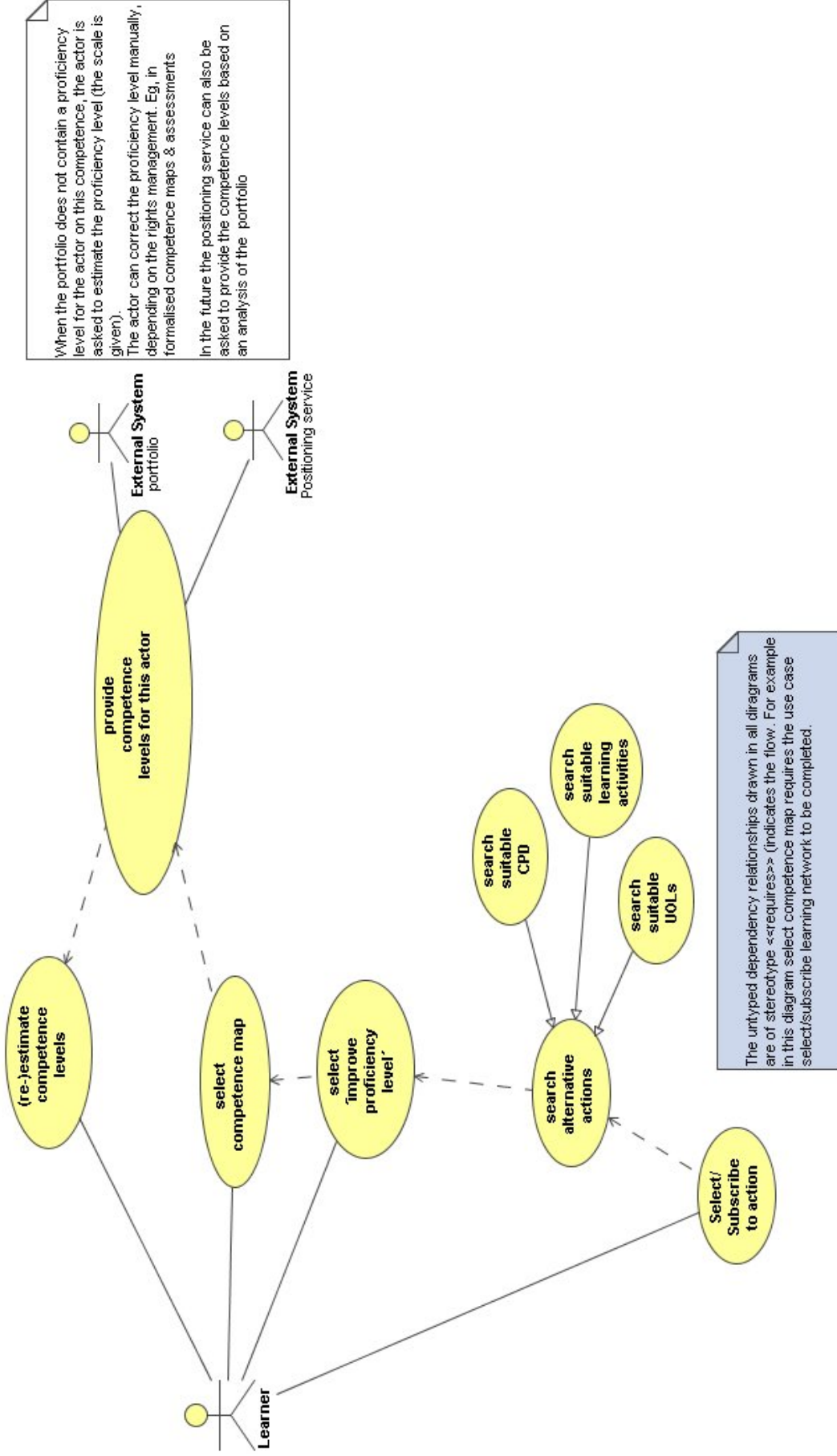
After selecting the competence that the learner wants to improve, he/she will be able to search and subscribe to the different actions available in the Learning Network (CPD, UOL, learning activities, ...).

When the learner improves some of his/her present competences, the system increases the level of this competence. If the learner acquires new competences, the system will place the learner in the first level available. All the changes made will be automatically reflected in the ePortfolio.

Also, the learner can estimate manually his/her competence levels and change the levels that are in the ePortfolio. The system asks the learner to estimate and modify manually the proficiency according the system scales if the ePortfolio doesn't contain a proficiency level for the learner's competence. In the future, the positioning service could be asked to provide the competence levels based on the learner's ePortfolio analysis.

MAIN USE CASES	SHORT DESCRIPTION
(re)-estimate competence levels	In some cases, the learner can change manually the competence levels that are reflected in the ePortfolio (although in formal settings the learner will not be allowed to change his/her proficiency level)
Select competence map	From a list of competence maps based on a search of the system, the user can select a specific competence map
Select 'improve proficiency level'	The user can improve the competence level of a competence reflected on his/her ePortfolio
Search alternative actions	The learner can search for actions in a LN that are different from the actions he/she was already subscribed to
Select/subscribe to action	From a list of actions of a LN, the user can select or subscribe to them. The actions selected by the learner are the actions that will get him/her to the desired proficiency level.
Provide competence levels for this actor	When a user has selected to improve one of his/her competence levels, the system takes by default one level higher from the one he/she had.

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5.1.3 Keep up to date

This use case has one actor:

- Learner

Three external systems are involved:

- Portfolio (External System)
- Positioning Service (External System)
- Notification Service (External System)

Prerequisites:

- The Learner must be connected to the system
- The Learner has subscribed/selected a learning network before subscribing an action.

Knowledge, skills, etc. change over time and professionals must update their competences to maintain their proficiency level. The mission of this use case is not getting a better job or acquiring a higher proficiency level, it's preventing the learner's proficiency level from going down.

The “Keep up to date” use case triggers the system to give the users a list of actions needed to keep up to date in their professions. This list of actions provided by the system is based on their ePortfolios and the updates or changes made in a specific function/job. The search could be performed in two different ways:

1. Any competence updates for the current function/job. He/she will see all the updates related to the competences that best fit with his/her actual competence levels of function/jobs by performing a search according to the information of the ePortfolio. That is, basing on the profile of the learner, the system should determine the gaps and suggest actions to fill those gaps.
2. Any new Learning Activities or UOLs that are directed towards the same level that the learner has. The learners will have the opportunity to look for new LAs & UOLs that have been added to the same level of a function/job that is already reflected within his/her ePortfolio.

Within the Learners ePortfolio a sort of functions/jobs with the level of each one will be possible. To get this sorted list, first users must select the option “Keep up to Date” in the system and then they have two options:

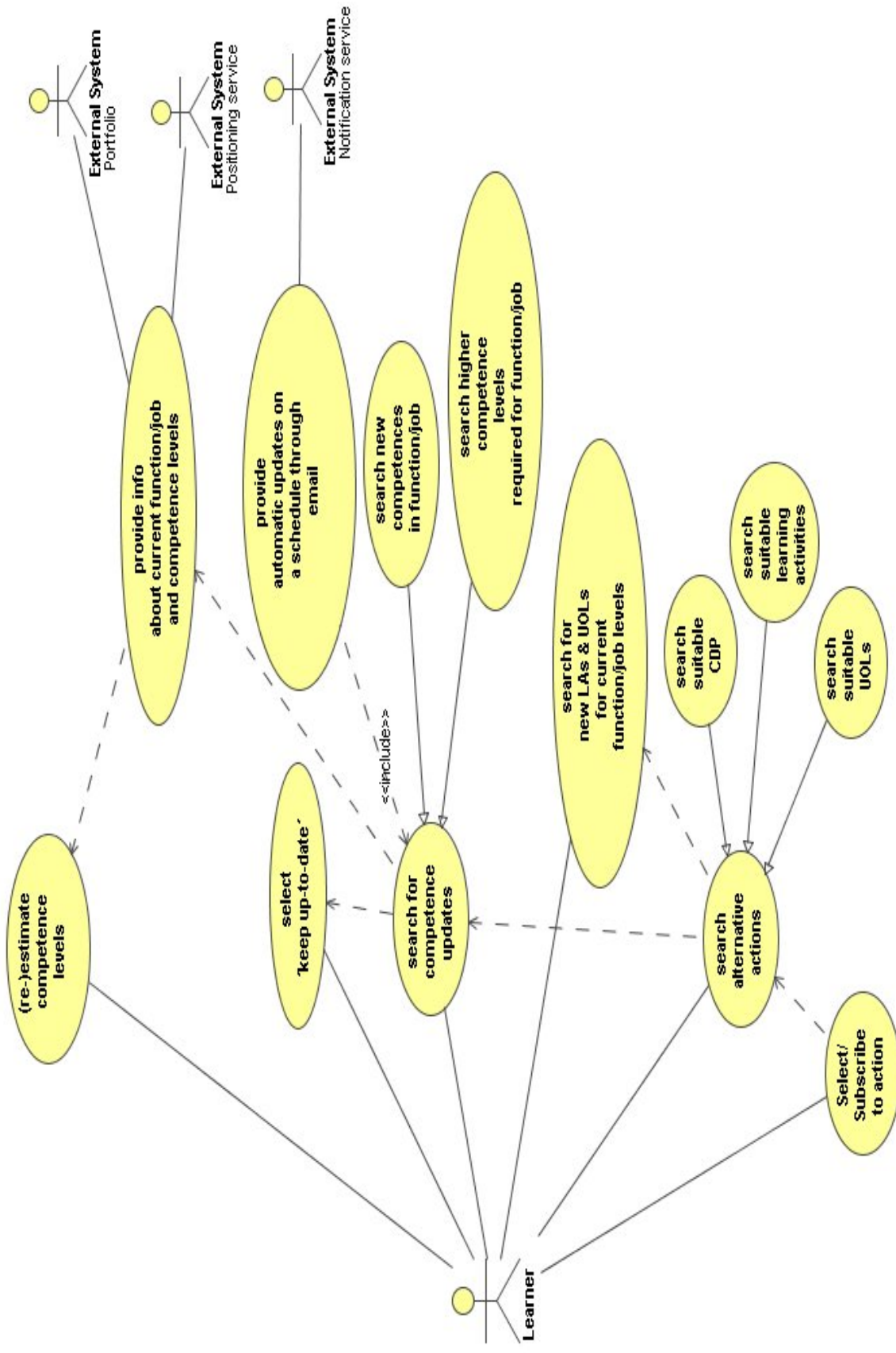
- receive the list in the system
- receive the list by email. By default, ePortfolio email address is taken, but users have the option to provide another email address if they prefer to use another address.

The periodicity of the updates could be: daily, weekly, monthly, etc.

Once the learners have checked all the available updates and changes on the different functions/jobs and all the new LAs and UOLs (depending on the option selected by the user), they will have the chance to look for and later select and subscribe to the different available actions (suitable CDPs, suitable Learning Activities and suitable UOLs).

Additionally, the learner can manually determine his/her competence levels, by changing the levels that are in the ePortfolio.

MAIN USE CASES	SHORT DESCRIPTION
(re)-estimate competence levels	In some cases, the learner can change manually the competence levels that are reflected on the ePortfolio (although in formal settings the learner will not allowed to change his/her proficiency level)
Select 'keep up to date'	The system offers the possibility to look for updates to 'keep up to date'
Search for competence updates	The learner can see all the updates for his/her own proficiency level.
Search for new LAs & UOLs for current function/job levels	The learner can directly search for new tasks that aim at the same levels of the function/jobs he/she has
Search alternative actions	The learner can search for actions in a LN that are different from the actions he/she was already subscribed to
Select/subscribe to action	From a list of actions, the user can select or subscribe to them
Provide info about current function/job and competence levels	Through the ePortfolio, the system is provided of information about the current situation of the learner to perform the search
Provide automatic updates on a schedule through email	The learner can receive the updates through email



5.1.4 Reflect on competences

This use case has one actor:

- Learner

Two external systems are involved:

- Portfolio (External System)
- Positioning Service (External System)

Prerequisites:

- The Learner must be connected to the system
- The ePortfolio has been generated
- The ePortfolio Competence levels are filled (in case that the system has not been able to do it automatically)

Based on the current Learner's proficiency levels, the system will show him/her all the new functions/jobs that match or are compatible with his ePortfolio. Based on this information, the learner will decide how to proceed.

To achieve this, an external positioning service will provide learner's competences levels from his/her ePortfolio (external to the system) to the system.

Then the system will identify the related competence maps and it will select all the functions or jobs for these competences.

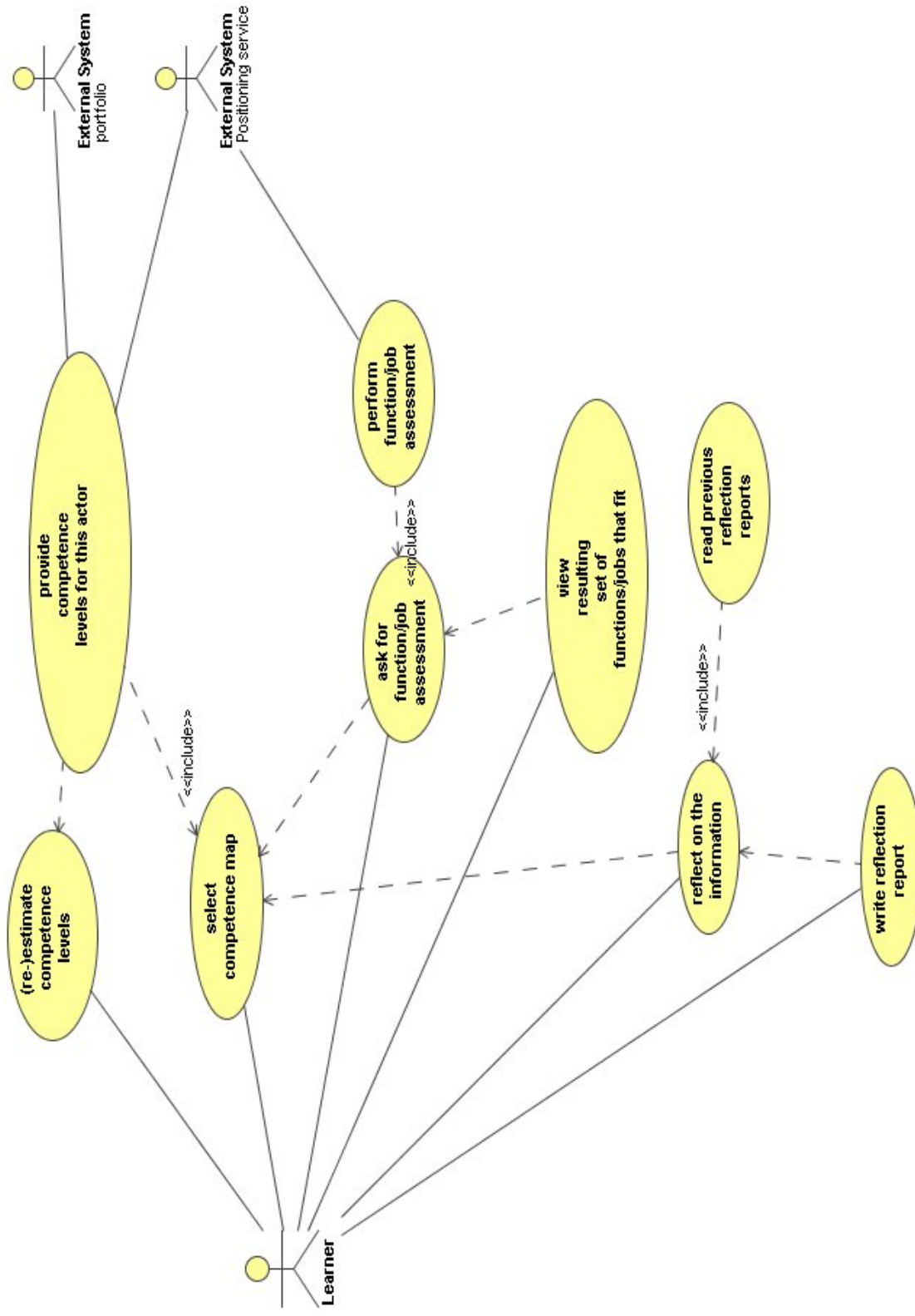
From this list of functions or jobs, the system will determine all the function/jobs that the learner could perform according the learner's competence.

The learner will generate a reflection report to record his/her reflection upon his/her own competences, i.e.: "Because I want to be a Math teacher later, I will have to work on my didactic skills. I'm first focusing on the mathematical courses, but I'm writing it down so I will think about it later. And so I can show my boss what I'm up to with my Personal Development Plan".

These reports will be stored to let the learner have access to the historic information and to reflect upon his/her own evolution and the actual situation.

MAIN USE CASES	SHORT DESCRIPTION
(re)-estimate competence levels	In some cases, the learner can change manually the competence levels that are reflected on the ePortfolio (although in formal settings the learner will not allowed to change his/her proficiency level)
Select competence map	From a list of competence maps based on a search of the system, the user can select an specific competence map
Provide competence levels for this actor	The system, through an ePortfolio and a positioning service, identify learner's competences and levels
Ask for function/job assessment	The learner can ask the system about the requirements for a specific function/job
Perform function/job assessment	The system provides information about the function/jobs the learner can perform
View resulting set of functions/jobs that fit	The system provides a list of function/jobs the learner could perform
Reflect on the information	Looking at different things (previous reports and current competence map view with matching functions/jobs), the learner can reflect on his/her situation
Write reflection report	The learner generates a reflection report to record the reflection on his/her own

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5.1.5 Study for a new function or a new job

This use case involves two user-stereotypes:

- Learner
- Author

And one external system:

- Navigation service (External System)

Prerequisites:

- The user must be connected to the system and should have selected or have subscribed to a learning network.

The main user-stereotype is the learner. His/her activities trigger the activities of the other user-stereotypes within the scope of this use case. The motivation of the learners in this use case is the wish or the need for the development of competences and skills for a new job or a new position. The goal of this use case is to find or create appropriate competence development programmes (CDPs) for the development of competences and skills that are necessary to master a new function or a new job.

If a learner has subscribed to a LN there are two opportunities to find CDPs that are suitable for a certain function or a job: first, there should be an open search facility that allows the learners either to pick the function/job from a list or to define a set of competence criteria that describes their function or job best. This way the learners express their wish to study for a new job or a function. By selecting “study new function or job”, the learners can select a CDP from a list of CDPs which is created according to the user’s profile. Second, there should be a catalogue-like list to browse predefined jobs or job functions. This implies predefined job or function descriptions from which the learners can choose.

Based on the selected job description the learners search the selected LN for suitable CDPs.

The learners receive a list of CDPs as a response to their request. From this list they can choose the best fitting one according to their needs and demands. This list can contain pre-designed CDPs, best practices (published successful tracks) and automatically generated CDPs. From these results the learners can select a CDP and subscribe to related learning actions.

After selecting a CDP the learners have to schedule the related learning actions and units of learning (UOL). The system should provide time intervals for the related learning actions and UOL according to user’s learning profile.

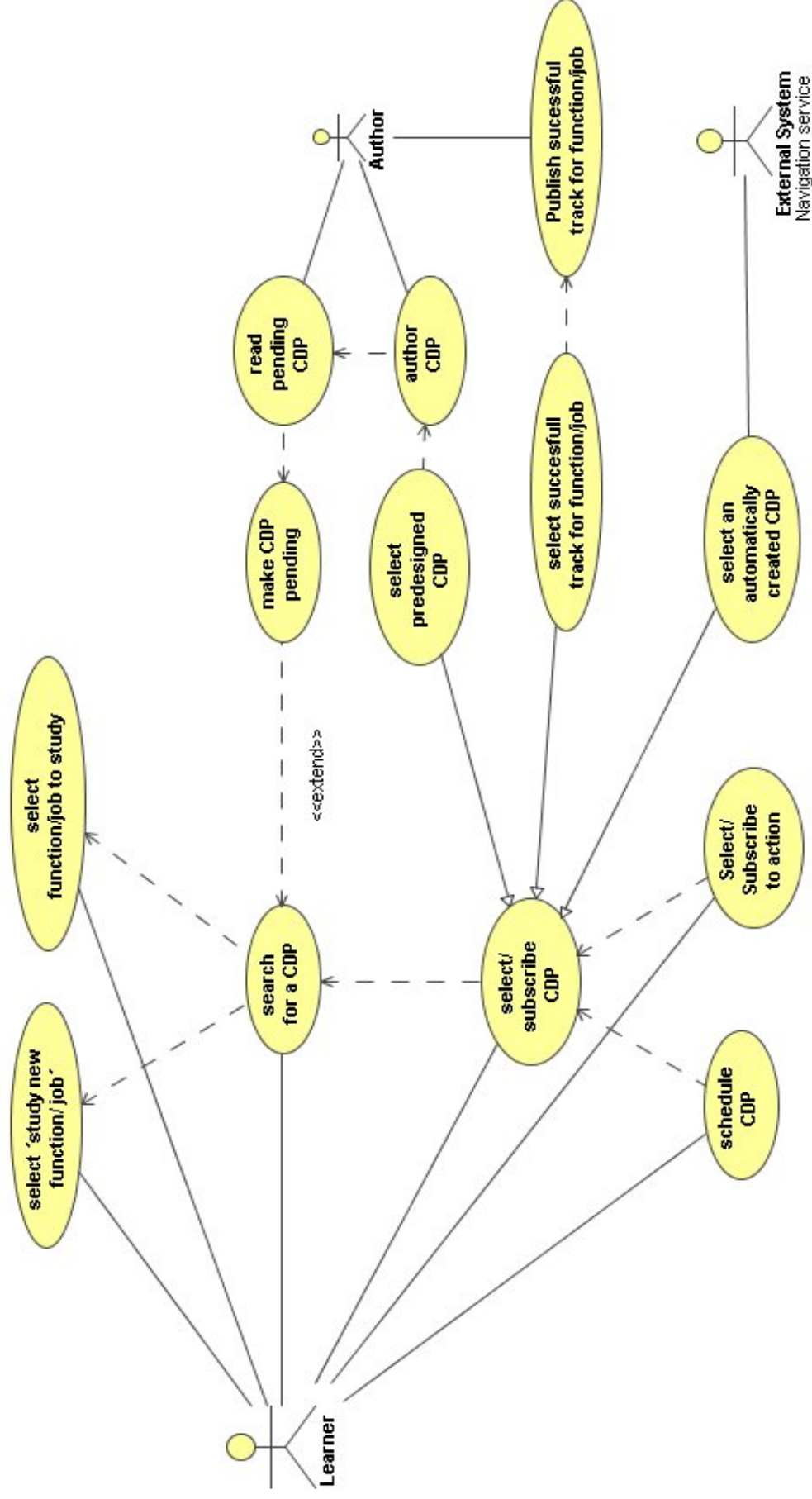
Automatically created CDPs are provided by external navigation services. This service tracks learning activities across CDPs of the LN and analyses these tracks in order to identify good practices and learning paths. This will provide learners feasible and tested pathways through the LN according to their learning needs. These pathways are based on the learning paths of other participants of the LN.

In those cases in which a search for a CDP does not return any results, the search is marked as a pending request for CDP. Authors have access to the pending CDP requests and can read them. Using the original job or function description provided by a learner

and the learner's profile, an author can create a new CDP or author an existing one. Such a CDP becomes available to the learners as pre-designed CDP. Optionally the system automatically generates a CDP outline that can be edited and extended by an Author or a Facilitator.

Additionally, authors can publish successful tracks for a particular function or job to the learning network. These successful tracks refer to good practices of professional development.

MAIN USE CASES	SHORT DESCRIPTION
Select 'study new function/job'	The learner expresses his/her learning needs by selecting this option
Search for a CDP	After selecting a LN, the learner can look for different CDPs
Select/subscribe CDP	From a list of suitable CPDs the learner can choose the one that best fits with his/her needs
Schedule CDP	After selecting a CDP the learners have to schedule the related learning actions and units of learning
Select/subscribe to action	From a list of actions of a LN, the user can select or subscribe to them
Read pending CDP	There are some search about a CDP that has no results, authors must read them
Author CDP	An author can create a new CDP from scratch; use an existing one as the base for a new CDP; or author an existing one
Publish successful track for function/job	The good practices about a particular function or job can be published
Select an automatically created CDP	Automatically created CDP are provided by external navigation services



5.1.6 Want some support

This use case has two user-stereotypes:

- Learner
- Facilitator

One main external system is involved:

- Portfolio service (External system)

The main user-stereotype is the learner. Their activities trigger the activities of the other user-stereotypes within the scope of this use case. The motivation of the learners in this use case is the need for support for an action. The objective of this use case is to provide support and to rate the received support.

The prerequisite of the use case is that a learner is assigned to an action, a function, a job, a competence or a proficiency level. Support requests are always bound to at least one of these aspects. This means that support is always related to a defined context. Within a defined context a learner who wants to get supported, needs to express his/her request explicitly.

Based on a support request the system will search for a support provider. This search is restricted by the learner's context and by a question that has to be entered. The search will return a list of those support providers who are likely to answer the learner's request.

In order to appear in the list of support providers Actors have to have to register in order to get recognised as Facilitators. The registration can be done on the level of:

1. Learning Activities, UOLs or CDP
2. Function/jobs
3. Competences in general (including general competences like “using the TENCC system”)
4. Proficiency level.

This limits the types of requests for which an expert is listed. Additionally, facilitators need to express or provide the areas in which they are able to provide support. E.g. they may provide their competence profile to the system.

Based on the list the learners can post their request for support to the potential support providers.

The request for support should be made pending if for a request for support no support provider can be found. Facilitators who are registered as potential support provider have access to the pending requests for support.

If a facilitator finds a pending request which they can support, they can choose to provide support to the learners.

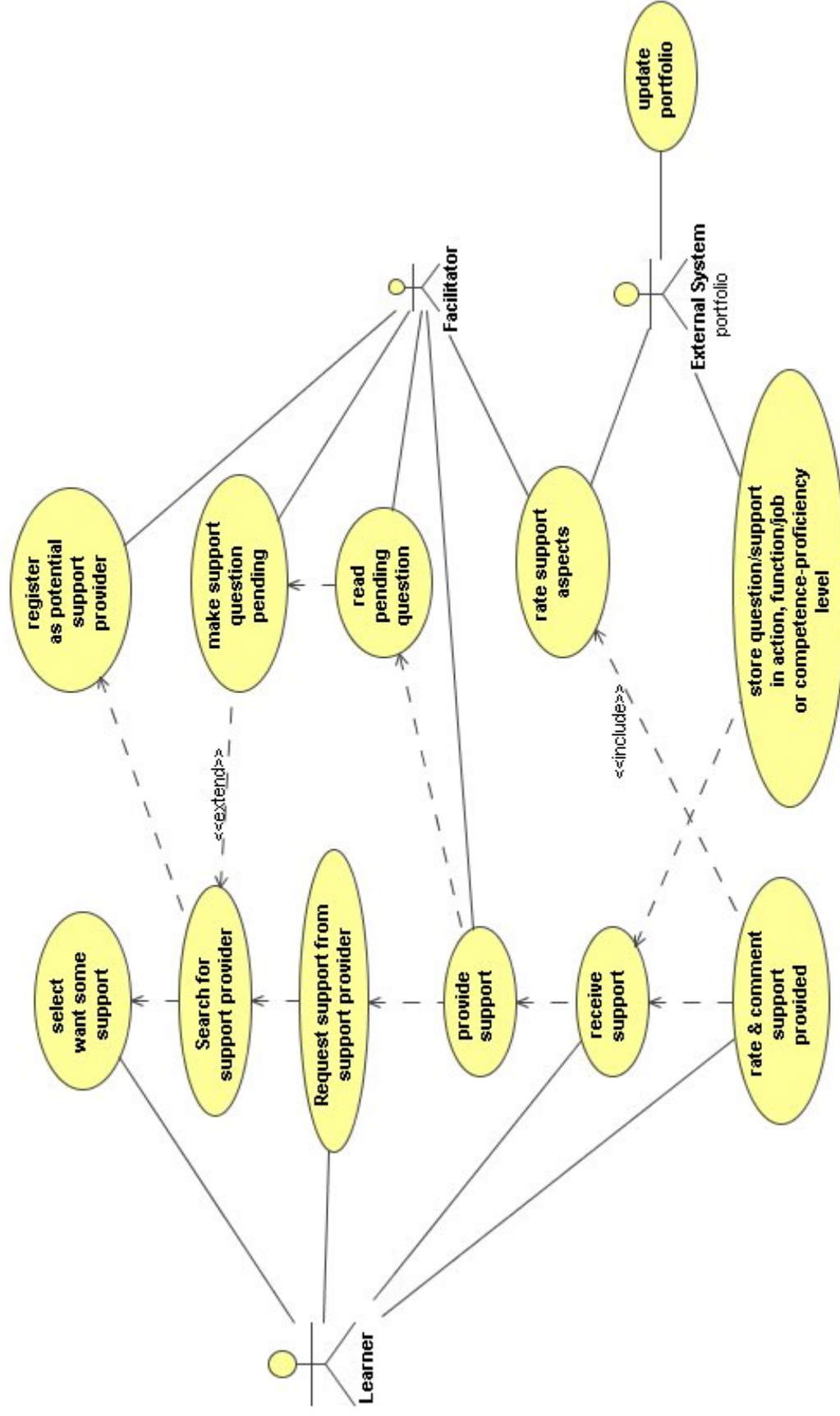
When support is provided to a learner, the learner has to receive and accept the provided support. At this step the support is actually instantiated as a complete communication between a facilitator and a learner. This includes the situation that different facilitator may provide support to a learner.

After learners have received support they have the opportunity to rate and comment the provided support. Rating refers in these terms to quality indicators, while commenting is related to the lessons learned from the support action.

Rating and commenting includes also the rating of the support provider. This expresses the level of competences of a facilitator from a learner's perspective. The facilitator has also the opportunity to rate the learners after providing support to them. This can be used to rate the learner's competence or proficiency level from the supporter's perspective.

If a learner has received feedback from a facilitator, this is stored in the learner's and the facilitator's profile. An external portfolio system will capture the ratings and comments in the portfolios of both participants in the support process.

MAIN USE CASES	SHORT DESCRIPTION
Select want some support	A learner wants support for a specific action
Receive support	A learner receives the requests of the providers
Rate & comment support provided	When a learner has received the support he/she can indicate the quality of the service and what he/she has learned with the support action
Register as potential support provider	Before a facilitator can give any support, he must register in order to appear in a list of potential support providers
Read pending question	facilitator can read the pending questions if that question didn't have the request
Provide support	A facilitator can give support when he/she finds the proper requests
Update portfolio	The ratings and comments made during the support are stored in the portfolio of a learner and a facilitator.
Store question/support in action, function/job or competence–proficiency level	The support process is stored.



5.2 Main Components

5.2.1 Learning Networks

A learning network is a conceptualised and structured virtual community environment with specific features and embedded dynamics. “Connector” agents, “Connection Dynamics” (game-like) and Network Navigation Tools will help us reflect both its formal and informal competence development purpose.

Users can include individuals who want to upgrade their knowledge, skills and competence in a discipline or profession, instructors who need assistance in designing learning activities, organizations and learning institutions in the process of implementing a competence development course, content and course providers who want to introduce new learning programmes, and practitioners and other stakeholders who are interested in keeping up to date with the discourse and developments in the field. As such, a Learning Network brings together disparate individuals with varying levels of competence and diverse objectives. This heterogeneity opens the door to a knowledge community within which members may draw upon the expertise of others, and in turn contribute to the collective body of knowledge.

“The purpose of the Learning Network prototype developed within WP8 is to help users to:

- gain an overview of and become aware of relevant Competence Development Opportunities⁴ (CDO),
- build an informed opinion about which CDOs would best fit their objectives and aspirations, and
- Get the possibility to share their experiences and engage in productive knowledge exchanges with other users”⁵.

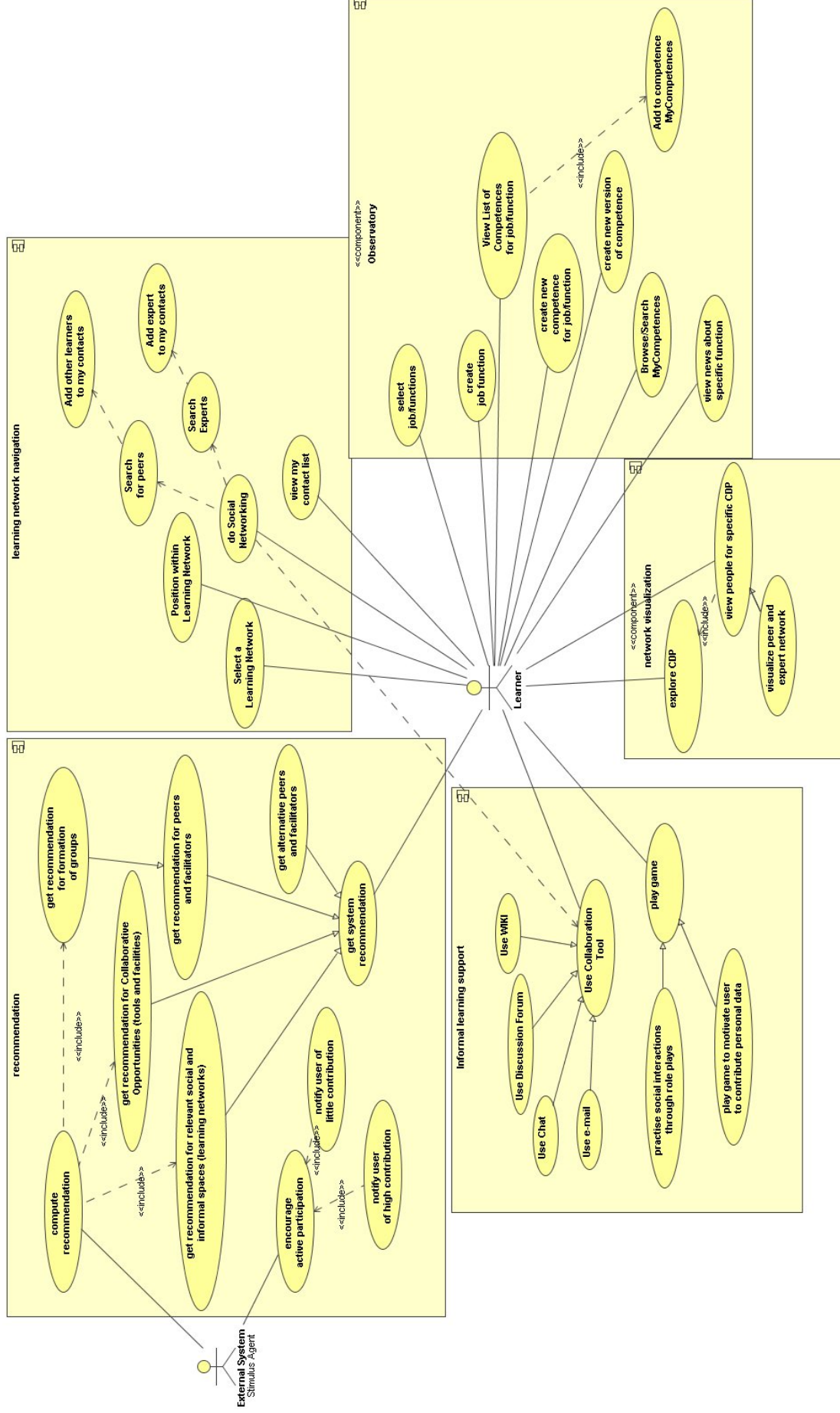
“Our main premise is to explore a combination of social network visualization tools, simulations, stimulus agents and management policies to enhance the self-organizing and knowledge sharing capabilities of communities of the users of the Learning Network”⁶.

⁴ A Competence Development Opportunity is any thing that is made available to members to facilitate their competence development.

⁵ As described in the Design document “Designing Socially-enhanced Virtual Community Environments in a Competence Development Context”, WP8 forum

⁶ Alicia Cheak, Albert A. Angehrn, Peter Sloep (2006), Enhancing Lifelong Competence Development and Management Systems with Social Network-based Concepts and Tools, *The 6th IEEE International Conference on Advanced Learning Technologies (ICALT 2006)*, Kerkrade, The Netherlands

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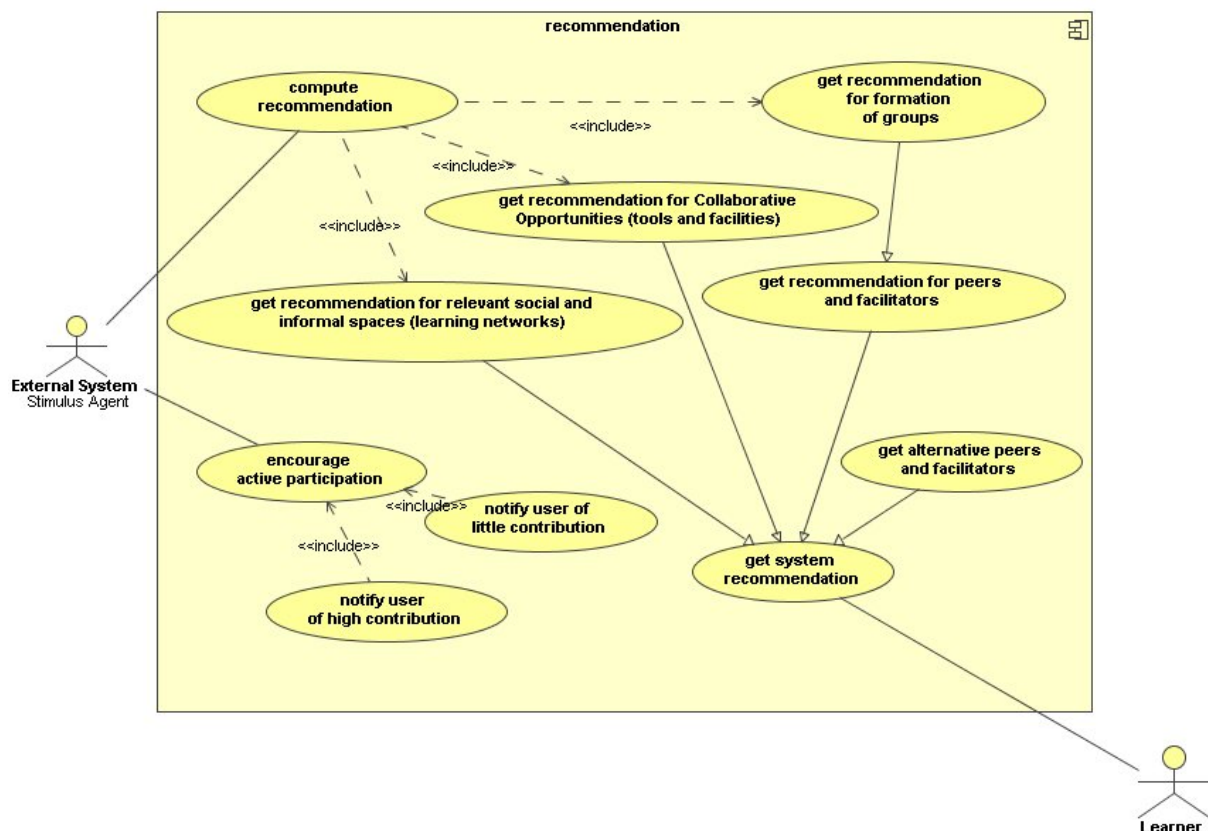
5.2.1.1 Recommendation

The agents will help the learner to get recommendation for formation of groups, for relevant collaborative opportunities and for encouraging active participation.

They will be useful to the learner in order to:

1. Reduce Search Costs for Identification of Relevant “Connections” (People, Competences, Competence Development Opportunities)
2. Stimulate continuous Open Exploration/Questioning and Intrinsic Motivation
3. Create Connections among People and Competence Development Opportunities
4. Introduce smoothly the “Competence Development Opportunities” World to Best benefit and contribute.

After receiving agents support for: a) Relevant Competencies Identification Process and b) Relevant Competence Development Opportunities Identification Process, a user will get suggestions for getting “connected”.



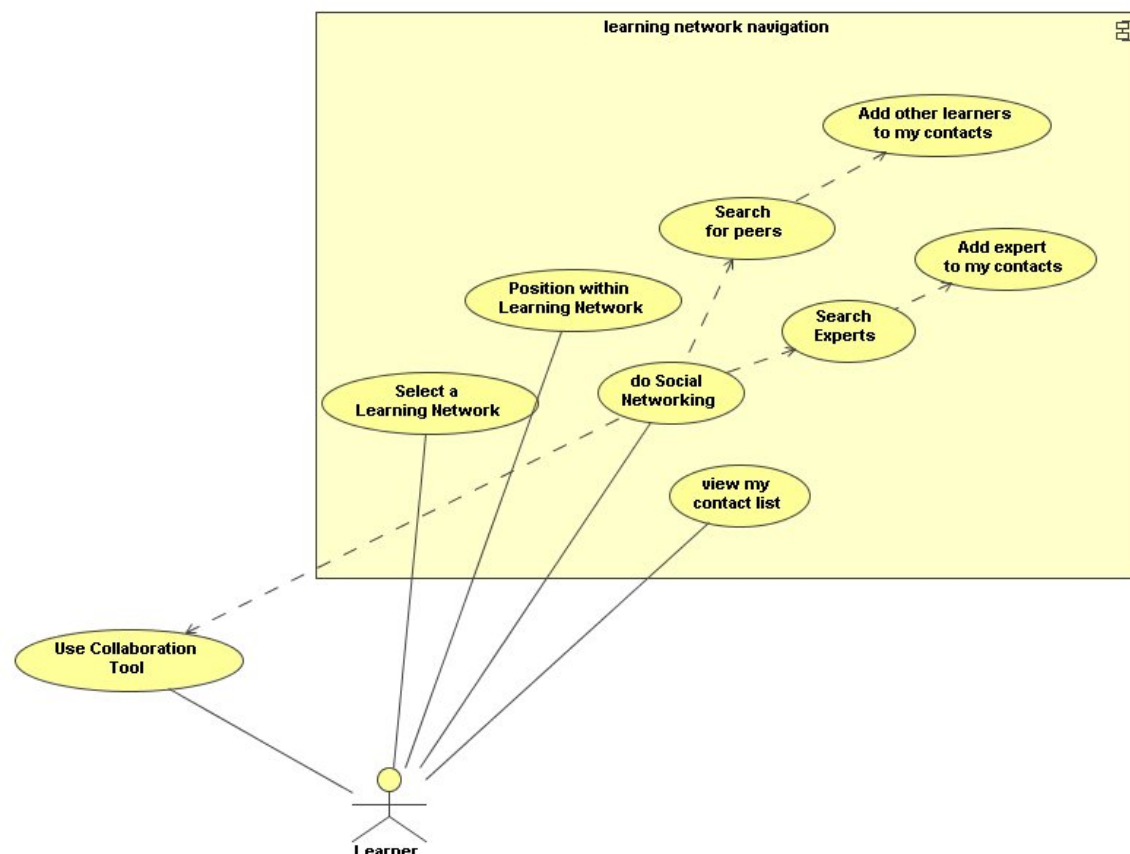
5.2.1.2 Learning Network Navigation

The Overview Tool will provide an integral overview of all the possible formal and informal programmes that are available for the users to develop their competencies. This includes search facilities, support through collaborative filtering and social interaction, planning techniques, data-mining and visualization of the search results. It will provide mechanisms for the learner to visualize Relationship Networks, whose Nodes are CDOs, CDO Types, People, or People Groups, and whose links are the different relationships defined between these Nodes. Such visualizations need to be “interactive” in terms of supporting users to use them for Navigating in dense Networks, enabling them to:

- Focus/zoom into a specific Node (focusing) or subset of the Network (zooming)
- To decide the visibility/overlay of different Nodes Sets and Relationship Networks
- To search by filters

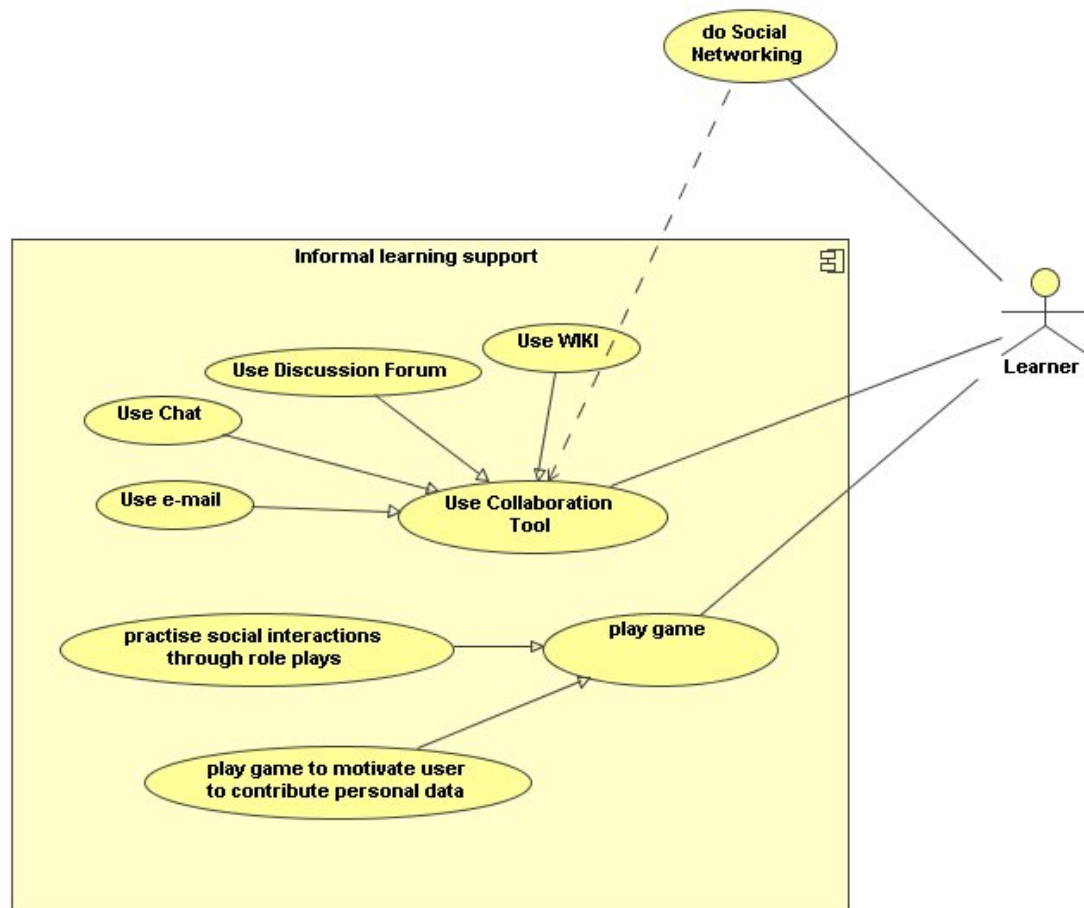
A 'people' filter will be used to display highly connected people (e.g., the hubs in a network). It will also display people who should spend some time adding links.

A 'relations' filter will display only the relations (between CDOs and/or people) selected by the user.



5.2.1.3 Informal Learning Support

In addition to the CDOs that can be found in the Learning Network, opportunities to learn and exchange informally will be available through the use of chat, wiki, discussion forum or by playing game to get “connected” with other users.



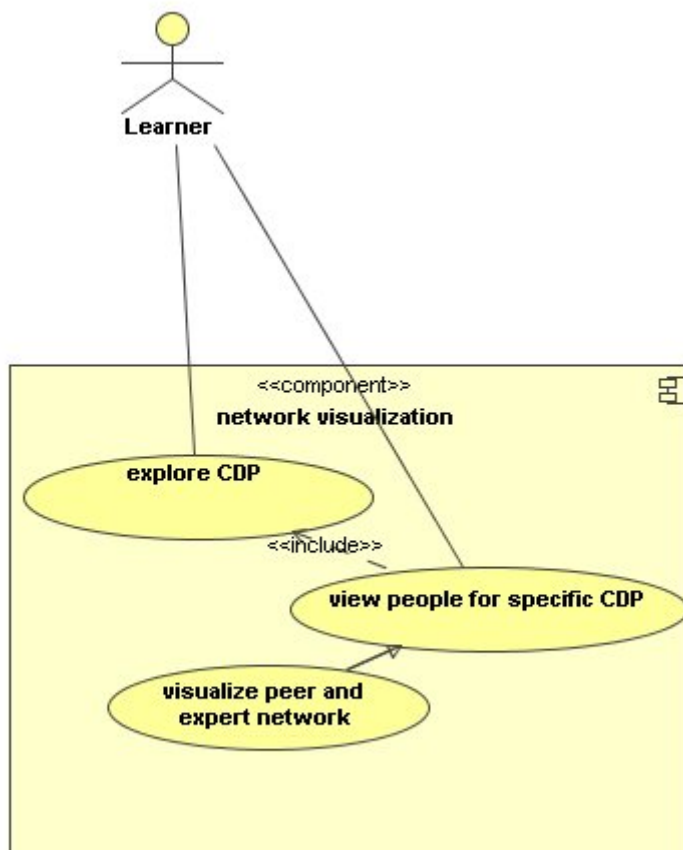
5.2.1.4 Network Visualization

Our main hypothesis is that information resulting from an analysis of the Social Network Dynamics (SND) within the Learning Networks and the design of specific SND-aware user experiences can have significant impact on:

- a) The value derived from user experience in the learning network in terms of helping them meet their objectives efficiently;
- b) The attitude and behaviours of users, with respect to pro-active knowledge exchange and collaborative involvement.

To conclude, the **basic features** of the Overview Tool include:

- Integration of Social Network Visualizations
- Classification of Competence Development Opportunities in terms of their formal and informal nature
- Dynamic linking of Users/Members to Competence Development Opportunities
- Dynamic Linking of Competence Development opportunities to Underlying Competences
- Dynamic Knowledge Exchange/experience capturing spaces.



5.2.1.5 Observatory

The TENCompetence Observatory will be used by the learner to monitor and capture the competences that have to be acquired in different professional and academic fields.

The users of TEN Competence Observatory will have the capability to enter to the TEN Competence Observatory and browse the competences that have to be acquired for his/her profession or perform a search for different jobs/functions that they are interested in. Moreover, the users can contribute their experience and share it with the other users of the TENCompetence Observatory.

Select job/functions

When the user enters the TENCompetence Observatory can select a job/function and view the competences that have to be acquired for the selected job/function. He/she can also see the different job/function levels that have been defined for the selected job/function.

Create job/function

The user can create a new job/function, which does not already exist in the TENCompetence Observatory. For the new created job/function the user can create several job/function levels.

View List of Competences for job/function

The user can select a job/function and view the list of Competences for this job/function. After that, the user knows which competences have to be acquired, in order to become more competent at his/her profession.

Add Competence to My Competences

The user can select a competence from the list of competences for a job/function and add it to his/her Competences. As a result, the user can create a list with desired competences that can be acquired at a later stage.

Create new Competence for job/function

The user may not agree with the specified competences for a specific job/function. As a result, the user has the capability to contribute his/her experience by creating a new competence for a job/function.

Create new version of Competence

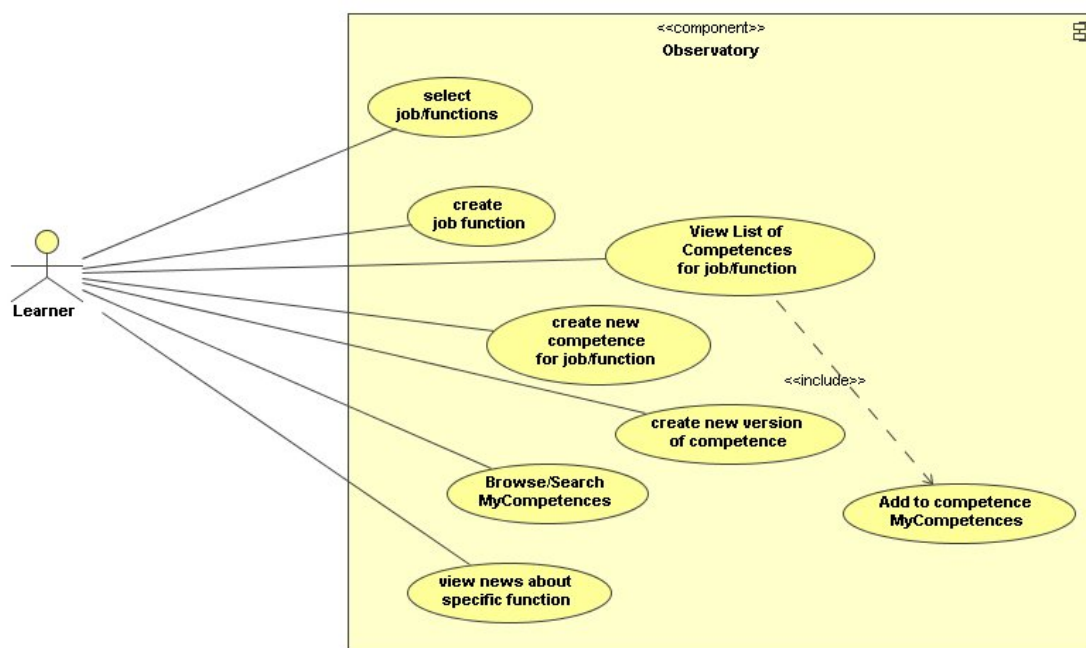
The user can contribute his/her experience by creating a new version of an existing Competence. He/She can also map this new competence with an existing job/function.

Browse/Search My Competences

The user can browse his/her private space where his/her competences are stored, in order to manage them. Moreover, the user can search his/her Competences by using specific searching criteria.

Views News about Observatory

Once the user enters the TENCompetence Observatory can see a list with News/Announcements about the TENCompetence Observatory. Furthermore, the user can select a specific announcement and view more details about it.



5.2.2 Competence Development Programmes

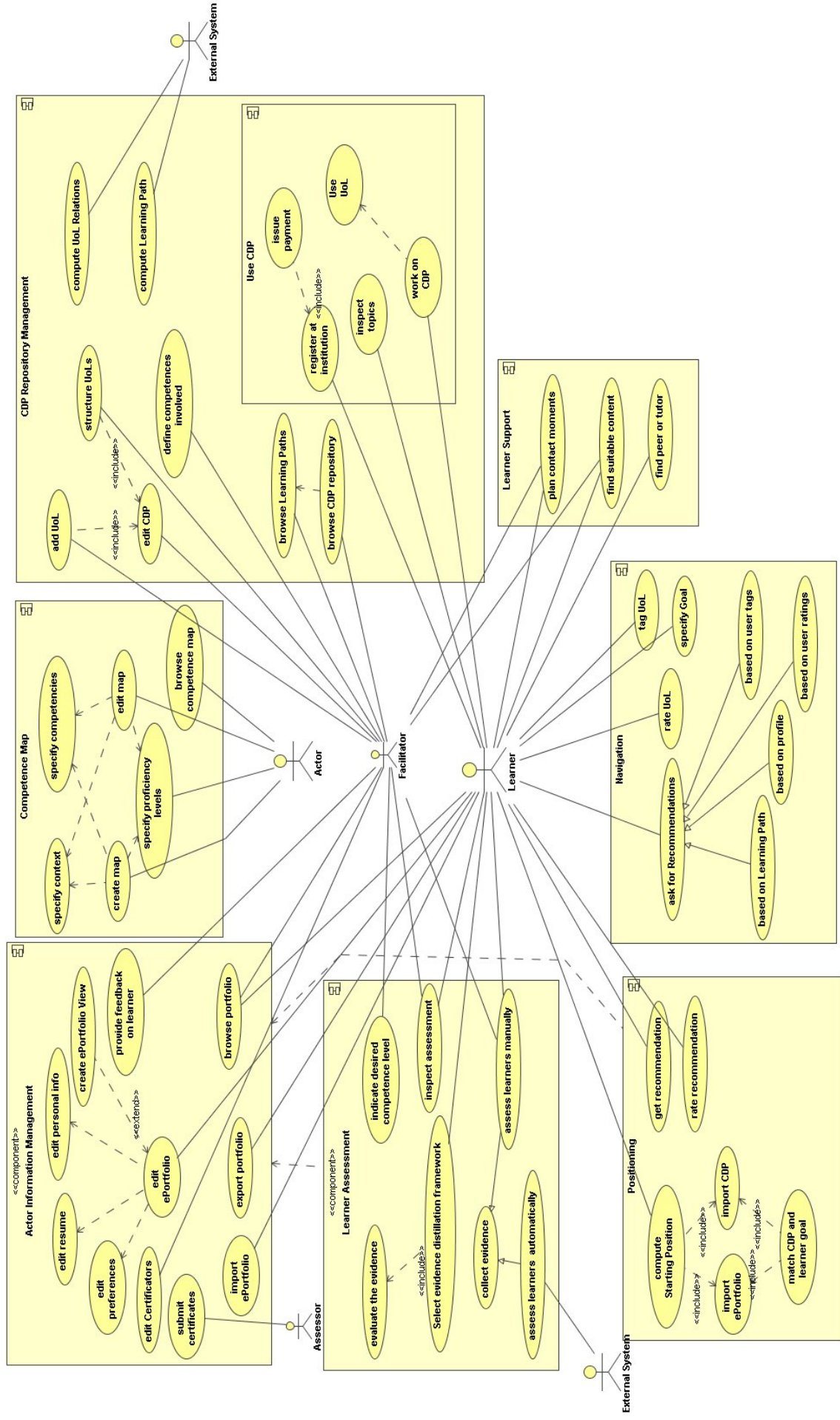
The Competence Development Programmes (CDP) subsystem is responsible for providing e-learning material authors means to structure their material in meaningful manners, and for providing learners means to plan their learning activities based on the material offered.

The system is intended to be used by three different kinds of actors – obviously, one person might fulfil the role of several actors at different points in time. First, there is the *facilitator*, typically a teacher who provides learning objects to the repository, supports the learners in their activities and assesses the learners' results. Second, there is the *learner*, who makes use of the system in order to build competences. In order to be provided with individualized support, learners also manage their learner profiles – which are being stored in *ePortfolios*. A different actor – not defined yet, but in a role of '*Master*' or '*Expert-Practitioner*' – is responsible for creating the competence maps that constitute the field of practice underlying the courses. The system makes use of functionalities offered by external systems: assessment results from the WP6 subsystem and collaborative filtering results from the WP8 subsystem.

Lifelong learning is more demand-driven than traditional learning – a change that has been influenced by the more self-guided character of e-learning as well. Learning material may include material that goes beyond the traditional courses, such as knowledge resources and help-on-the-spot mechanisms. Rather than offering learning material in predefined curricula, a more flexible approach is desirable – an approach that combines traditional course sequencing mechanisms and more semantic structuring mechanisms.

The flexible structuring of – possibly a large amount of – material, with several views and mechanisms for searching and browsing, requires additional functionality for filtering the available options and for sequencing the material, based on the personal preferences of the learner. The above functionality is provided by the CDP subsystem. In a nutshell, it consists of the following components. Facilitators (typically authors of e-learning material and teachers) contribute their produced *units of learning* to the **CDP Repository Management**, and provide the information needed for structuring them into curricula and other kinds of formal and informal learning programmes. Tools for browsing the available material, and automatic structuring are available. Learners make use of the CDP Repository by inspecting its contents, registering for courses and following them. The available learning material is linked to the underlying competences, which are modelled in the **Competence Map** (*Competence Observatory in WP8*). **Learner Assessment** provides information about the learners' abilities and goals. These assessment results, in combination with issued certificates, and additional information provided by learner or facilitator, are stored in an **Actor Information Management**, of which a central unit is the ePortfolio. The learners' use of the CDP is facilitated by three kinds of 'personalization services, which depend on the material available in the Actor Information Management. The **Positioning Service** helps the learner in selecting the relevant learning material. The **Navigation Service** helps the learner in planning the learning activities, and provides advices for the *next best step(s)* to be taken, based on the learners' profiles, available learning paths, and peer recommendations. The **Learner Support Service** is there to facilitate the learners' contact moments with tutors, and to find suitable content or peer learners, to provide help on questions that cannot be answered by the system itself.

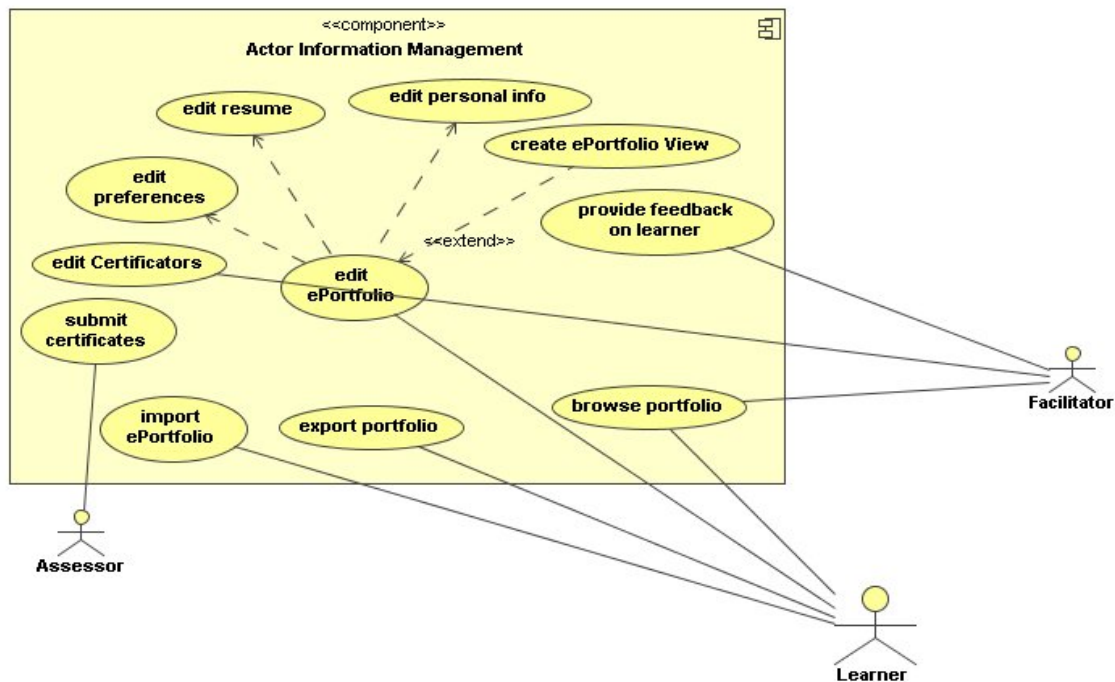
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5.2.2.1 Actor Information Management

This component is used for storing and accessing the information related to a learner, to be used by the facilitators and individualization services. The core element is the ePortfolio, a collection of learner information, which is mainly maintained by the learners themselves. *Editing* an ePortfolio comprises *editing personal information, preferences and resume*. Most information in the ePortfolio is assumed to be free-text, with some amount of metadata for identifying the several parts. *Certificates* – which may include letters of recommendation – are submitted by *certificators*, who have been approved by the facilitator. *Facilitators* may also provide feedback on the learner – for example interim learning results – to the ePortfolio. Administrative actions include the *import* and *export* of ePortfolios, to enable exchange with other systems.

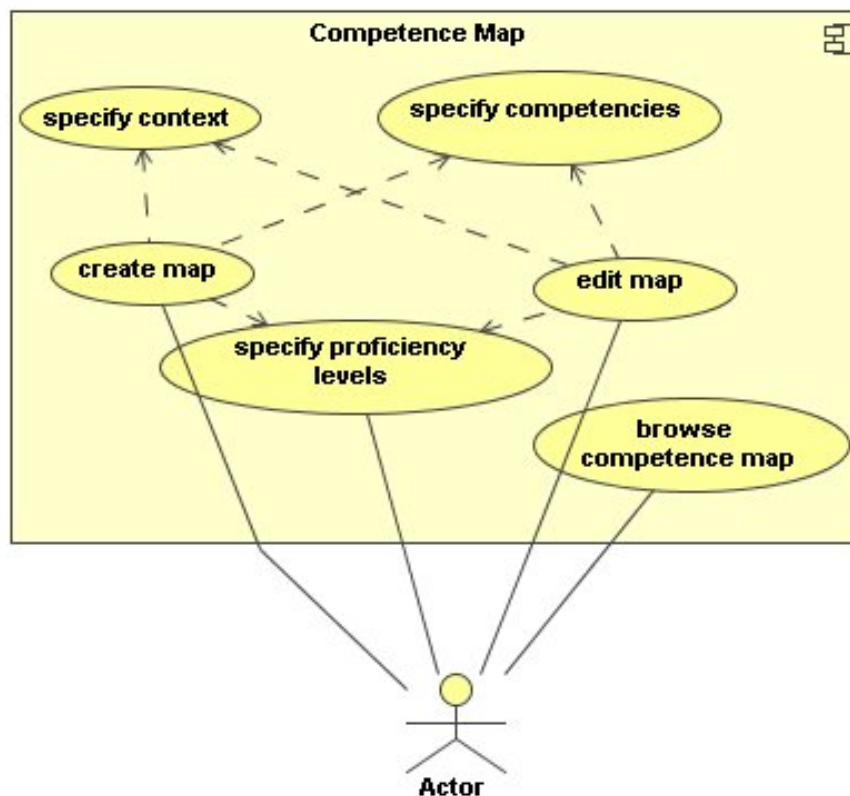
Learners may create one or more *ePortfolio views* that can be *browsed* by facilitators, for example tutors or mentors who help the learner in constructing a learning programme.



5.2.2.2 Competence Map

We expect the competence map to be used by several kinds of *actors* (author, learner, ...). First, a domain expert may *create a competence map*, or *edit* an existing competence map. For each competence, the *competencies* (knowledge, skills), the *context* in which these competencies are used, and the desired *proficiency level* can be specified. All available competencies in a domain can be related in a *competence map*, which specifies the relations between the various competencies. Graph visualizations and query mechanisms may be used by the facilitator to *browse* the competence map, in order to get an overview.

Note that the competence map does not directly a learners' abilities or requirements for a job; it is a model for reasoning about these issues – to be used by the Actor Information Management.

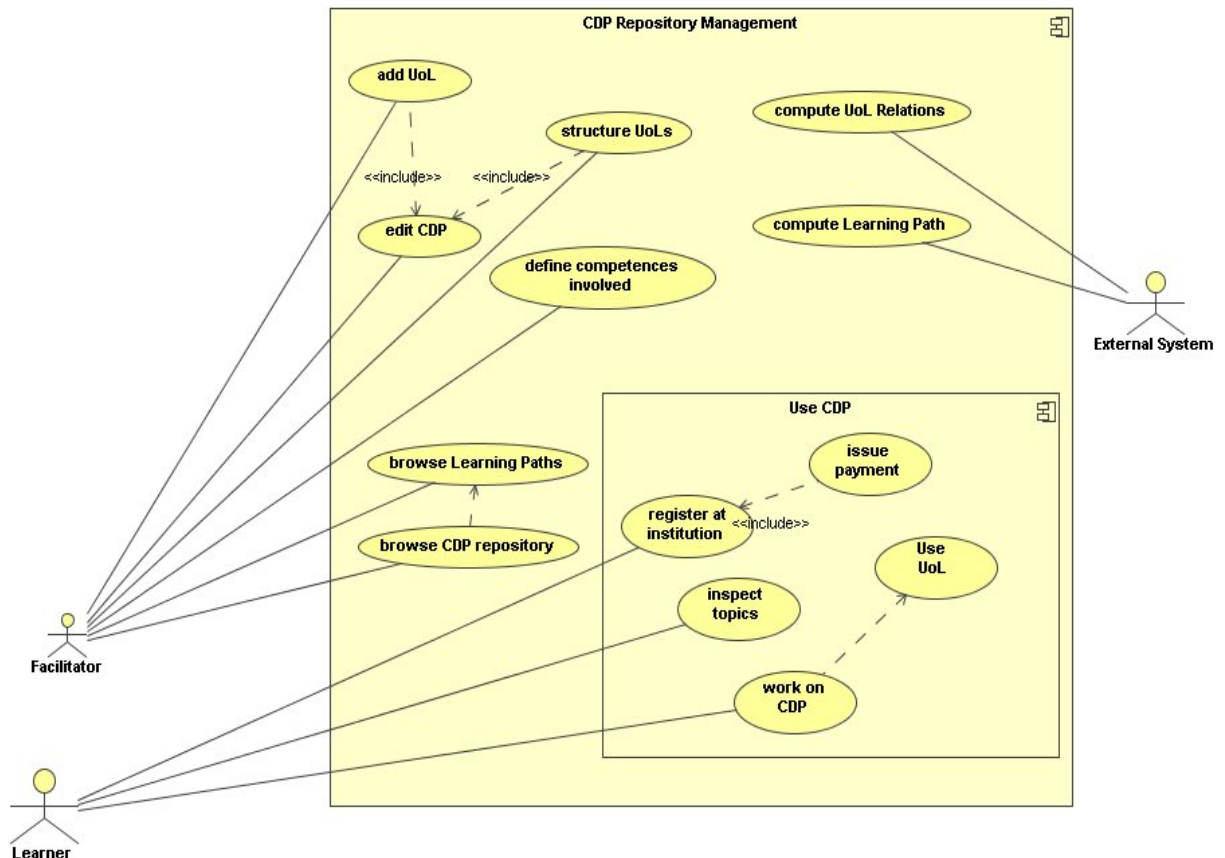


5.2.2.3 CDP Repository Management

The facilitators' interface for the CDP Repository Management provides means for contributing units of learning (UoLs), and structuring them. Upon *adding a UoL*, manually added metadata – in particular the *competences addressed by the UoL* – and relations are used for *structuring the UoLs*. This process may be facilitated by an external system or sub component, which uses semantic reasoning or information retrieval methods to *compute relations* and *possible learning paths*, based on the provided data and the material already available. These relations will be reflected graphically in overview diagrams, and taken into account by the positioning and navigation services. Facilitators may *edit* (create, modify, delete) competence development programmes, by relating (their own and other facilitators') units of learning. This process is supported by navigation and overview tools for *browsing the CDP repository* and *browsing available learning paths*.

The learner does not contribute to the CDP Repository, but makes *use of the CDP*. This involves administrative actions, such as *registering at an institution* and *issuing (tuition) payments*. Most importantly, learners are provided various tools for *inspecting the available topics* and for *working on a CDP*. The use of the CDP is greatly facilitated by the three services (positioning, navigation, learner support), which will be described at a later stage.

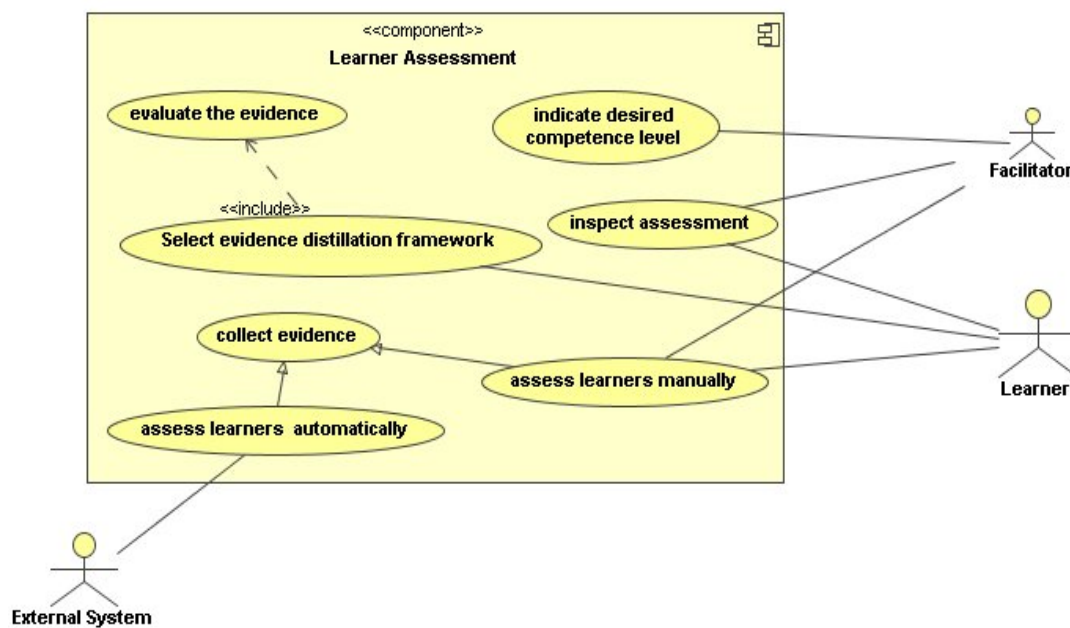
It is important to know that the available CDPs may be formal (for example, a Master's programme), or rather informal (for example, a suggested list of courses to follow, in order to learn Chinese).



5.2.2.4 Learner Assessment

Evidence of learner knowledge or performance can be *collected* in two manners: learners may be assessed *manually* (for example, an oral exam after having performed a learning activity) or *automatically* (for example, by analysis of the learners' credentials, written work and other types of evidences). Facilitators may *inspect* the assessment results and compare them against *indicated desired competence levels*. As various *evidence distillation frameworks* may be appropriate, selection between alternative options should be possible, and *evaluation* of the distilled evidences.

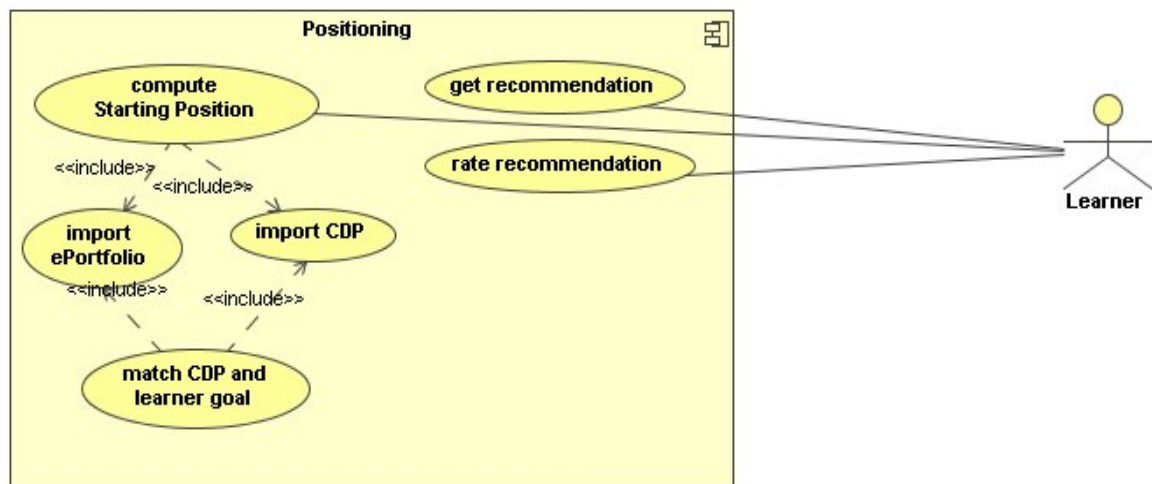
Assessment mainly takes place at the level of Units of Learning and Learning Activities, and is therefore described in more detail in section 4.2.3.



5.2.2.5 Positioning

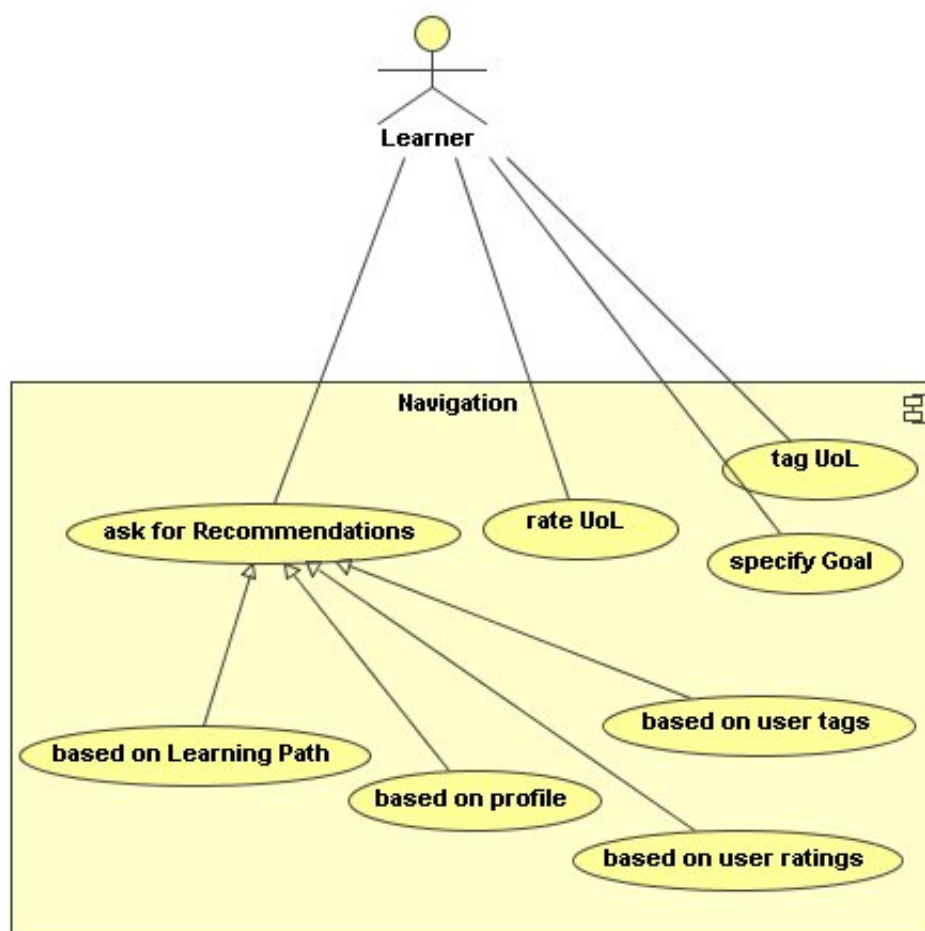
The positioning service helps the learner in selecting the relevant learning material. This may be done by automatically *computing the starting position*, based on a *matching* between *CPDs* and the learner's *ePortfolio*. The matching process may involve selecting the most appropriate curriculum and determining which part of the curriculum may be exempted, or selecting – possibly independent – units of learning that contribute to the learner goal.

As it is most likely that the computed starting position will not be exactly match the learner needs, the positioning service will be an interactive process with the learner, who *gets recommendations* and explicitly or implicitly *rates* the recommendations.



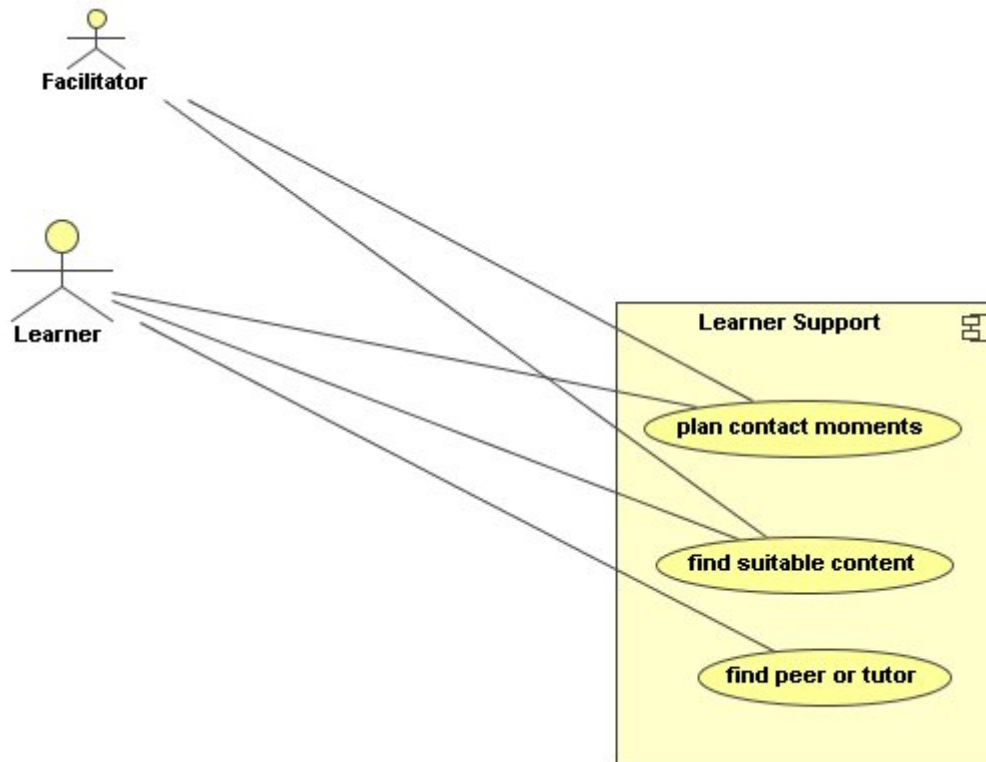
5.2.2.6 Navigation

The navigation service helps the learners in planning their learning activities by providing *recommendations* for the next best step(s) to be taken. These recommendations may be based on designed *learning paths*, based on a matching with the *learner's profile*, or collaborative mechanisms such as *users' ratings* and *users' tags*. Items that are highly rated by peer learners with a similar profile (based on stereotypes or other clustering methods) could be promoted; additional qualitative information is provided by the tags left by peer learners. Learners may influence the behaviour of the navigation service by actively providing *ratings* and *tags* themselves, as well as by further *specifying their learning goal*.



5.2.2.7 Learner Support

The learner support service provides tools for facilitating contact between learners and their tutors and peer learners. This includes calendar functionality for *planning contact moments*, but most importantly tools for *finding suitable content*, and *peers or tutors* who can help the learner with questions that cannot be easily solved by the system. The above-mentioned tools will be based on a matching between the available material and user profiles, and the specific need of the learner.



5.2.3 Units of Learning & Learning Activities

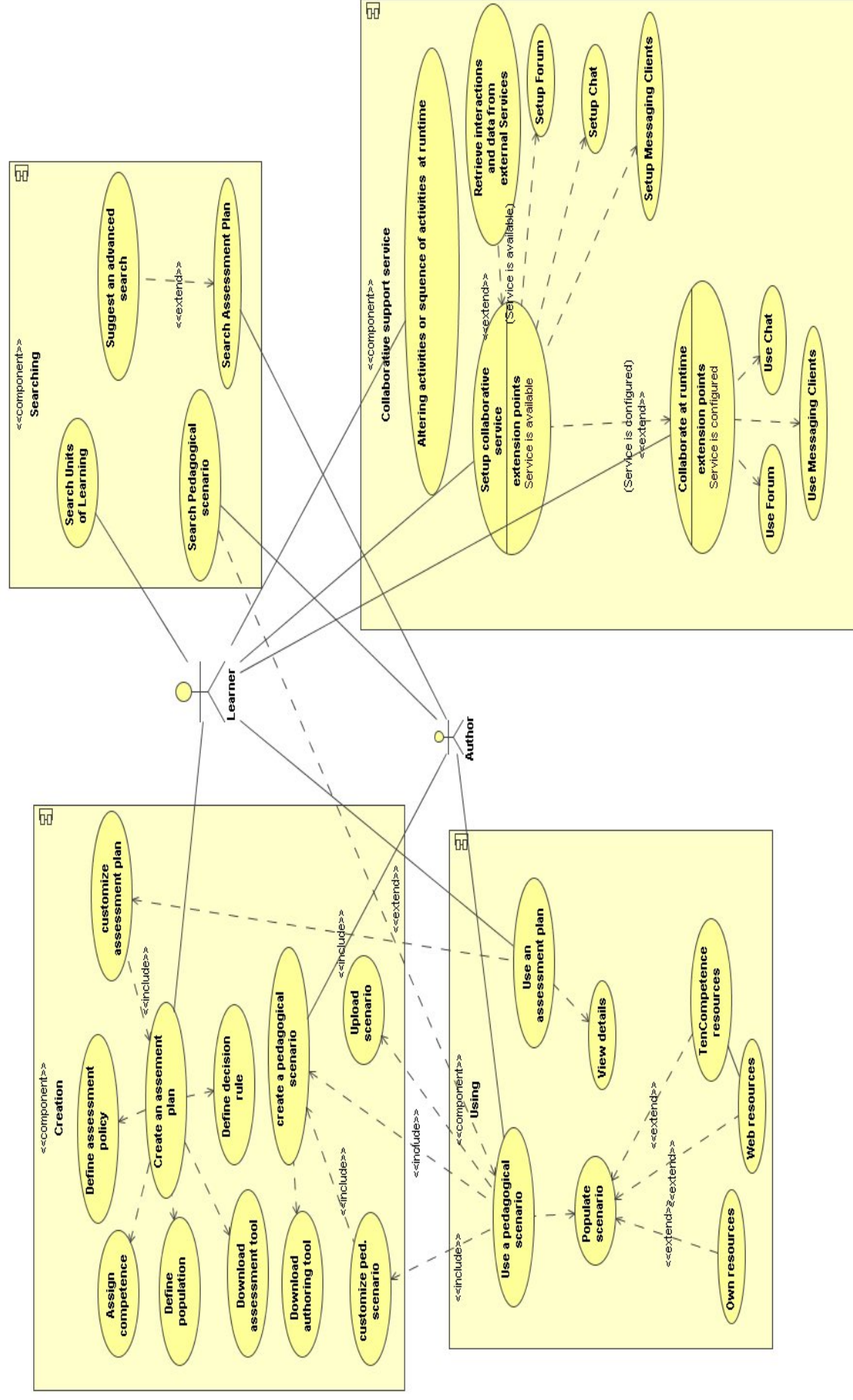
The WP6 tool set consists on the following components:

1. The TENCompetence IMS LD Authoring Tool, that will provide support to learning designers and pedagogical practitioners in using their pedagogic skills to develop Learning Activities and Units of Learning which assist in attaining certain competences. This tool will be a higher-level graphical Learning Flow tool that enables practitioners visualize and assemble Units of Learning easily.
2. The TENCompetence Assessment Tool, that implements the TENCompetence Assessment model which combines new assessment types (e.g. 360-degrees feedback and portfolio assessment) and the ones included in the IMS Question and Test Interoperability (IMS QTI) specification, as an internal part of the design process of a Unit of Learning, are necessary.
3. The TENCompetence Run-time engine, that implements the TENCompetence Connection Protocol which will describe how IMS Learning Design Run-time Engines can be connected to external collaboration and communication services, in order to support pedagogical models that require the use of such services (e.g. collaborative learning).

The users of this tool set vary, depending on the provided type of learning:

- In the case of *Formal Learning*, examples of users are Expert Learning Designers, Educational Practitioners etc.
- In the case of *Informal Learning*, a typical user is the Individual Learner.

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5.2.3.1 *Creation*

Create a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool creates a Pedagogical Scenario, by specifying Activities (Learning and Support Activities), the flow of these Activities, the participating Roles, the environment in which these Activities take place, properties and conditions upon the flow of Activities, and the description of the Activities using a Pedagogical Vocabulary. Finally, the Pedagogical Scenario is saved. Depending on the designed Scenario, this may be used as a component in another (more complex) Scenario.

Download the Authoring Tool

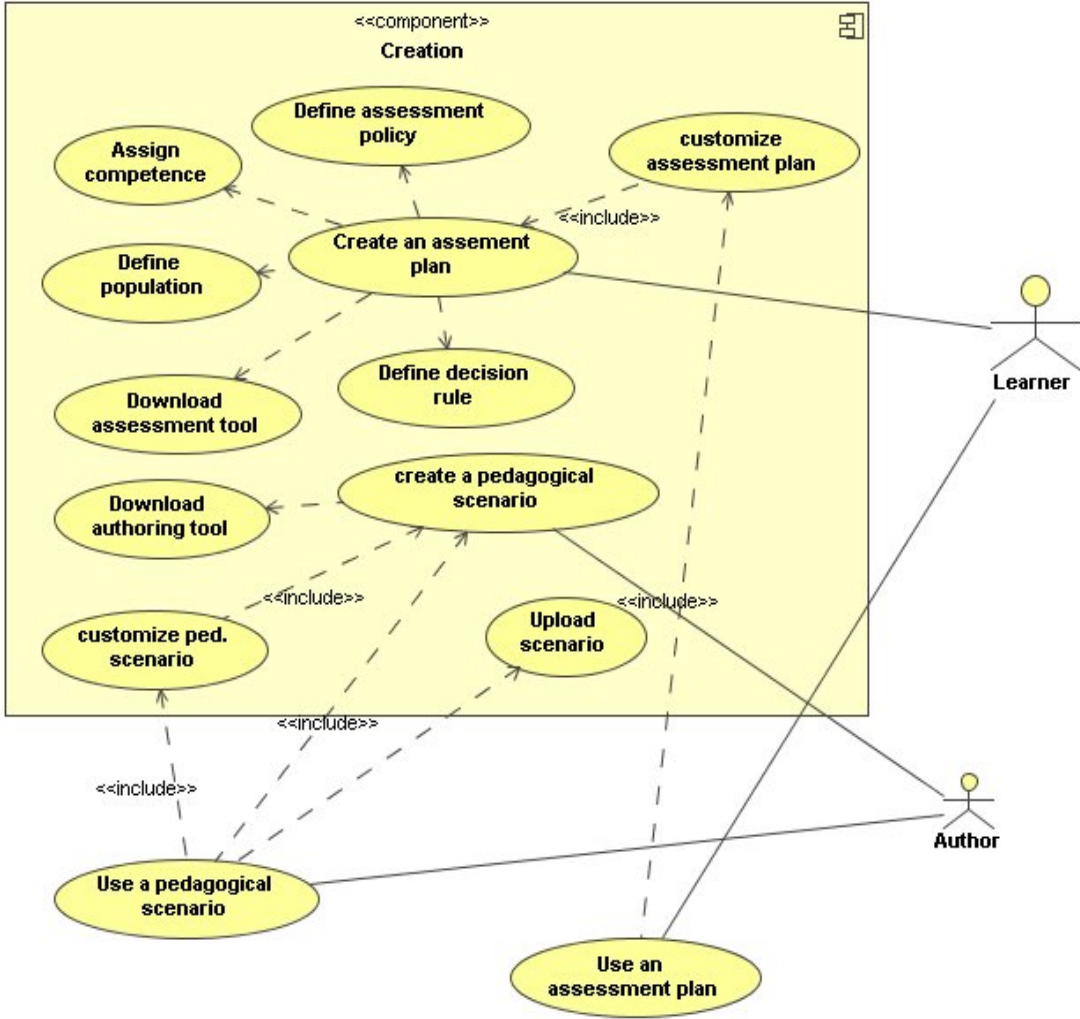
A user wants to use the TENCompetence IMS LD Authoring Tool. He/she enters the TENCompetence Sourceforge project that contains the available TENCompetence tools. The user selects to download the TENCompetence IMS LD Authoring Tool.

Customize a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool wants to create a Pedagogical Scenario, by customizing a pre-existing one. In order to achieve that, the user first searches for a Pedagogical Scenario (see Use Case: Search for a Pedagogical Scenario) and then selects one from the list of retrieved Scenarios. After that, the user may alter, delete or insert new elements to the Pedagogical Scenario. Finally, the user saves the Pedagogical Scenario.

Upload a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool uploads a Pedagogical Scenario to a Repository of Pedagogical Scenarios in order to make it available to other users. As a first step, the user either selects a Pedagogical Scenario or creates a new one (see Use Case: Create a Pedagogical Scenario) or modifies (customizes, see Use Case: Customize a Pedagogical Scenario) an existing one. Then, he/she uploads it to the TENCompetence Repository of Pedagogical Scenarios.



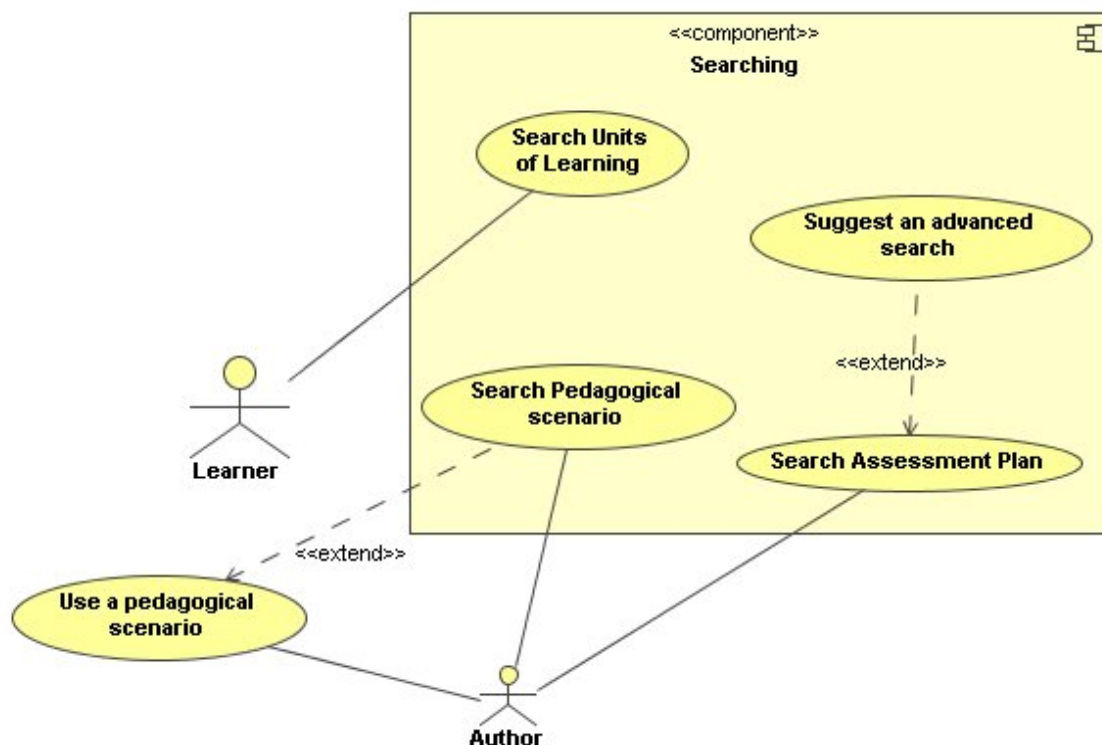
5.2.3.2 Searching

Search Units of Learning

A user of the TENCompetence IMS LD Authoring Tool wants to search for a Unit of Learning (UoL), within a Repository of Units of Learning. The user follows the next steps during his/her search: enters the Repository of Units of Learning, makes a search for a Unit of Learning using metadata keywords for the search, and finally evaluates the findings of the search using a pedagogical vocabulary.

Search for a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool wants to search for a Pedagogical Scenario, possibly within a Repository of Pedagogical Scenarios. The user follows the next steps during his/her search: enters the Repository of Pedagogical Scenarios, makes a search for a Pedagogical Scenario using metadata keywords, and finally evaluates the findings of the search using a pedagogical vocabulary.



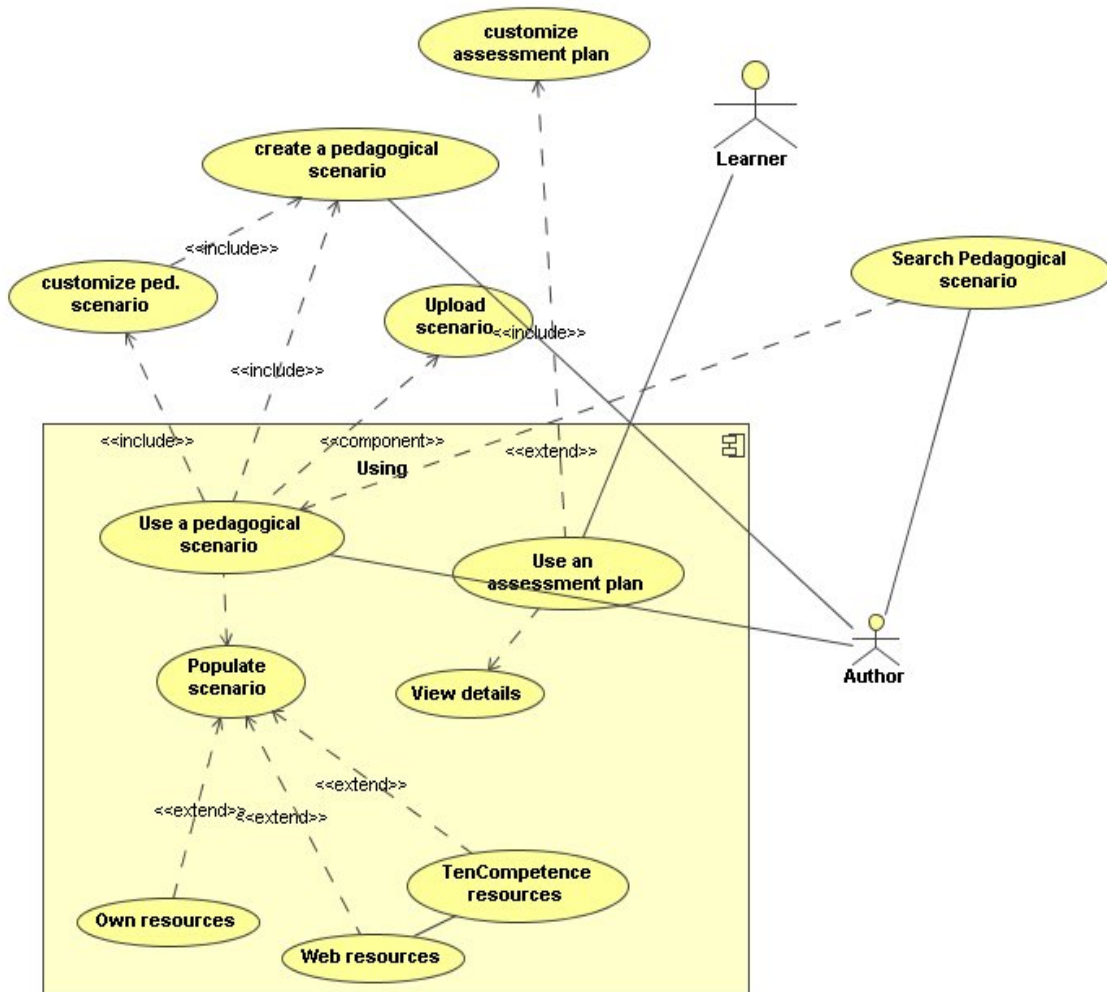
5.2.3.3 *Using*

Use a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool wants to use a pre-existing Pedagogical Scenario for creating a new Unit of Learning by populating the Scenario with educational resources. As a first step, a search is performed for a Pedagogical Scenario (see Use Case: Search for a Pedagogical Scenario) and then a selection of the appropriate (for the desired use) Pedagogical Scenario is made from the search results. Alternatively, the user may create a Pedagogical Scenario as a first step (See Use Case: Create a Pedagogical Scenario). After that, the Scenario is populated with resources (see Use Case: Populate a Pedagogical Scenario). Following this step, a Content Package is created and saved locally.

Populate a Pedagogical Scenario

A user of the TENCompetence IMS LD Authoring Tool wants to populate a Pedagogical Scenario with resources so as to create a Unit of Learning. In order to accomplish this, the user selects an Activity within the Pedagogical Scenario, interprets the semantics of this specific Activity by inspecting the available metadata, and identifies the required resources that need to be specified in order to support it. For each resource needed the user searches and selects the appropriate files (which could be resources of the user, web-based or TENCompetence resources) and associates them with the relevant Activity. The process described above is then repeated for all activities contained in the Pedagogical Scenario in use.



5.2.3.4 Collaborative support service

Altering activities or sequence of activities at runtime

Typically this situation may occur whenever a critic situation happens at run time and a specific UOL requires urgent changes (e.g. modifying / supplying a missing a definition; modifying / adding resources, activities, conditions). Therefore, after the run time is suspended (this can be done by the system if a run time error occurs, or by a user), the authorized user will perform the needed changes via a special user interface prompted by the system. Once the due changes have been performed and submitted, the run is resumed either from the starting point or from the interruption depending on user's choice or system's constraints (e.g. the interruption occurred doesn't allow to continue the interrupted execution).

Retrieve interactions and data from external Services

Retrieving interactions and data from external Services occur whenever a service in a learning process interweaves at design-time and run-time, whereby data concerning the learners / staff interaction with the service is used in the further progression of the learning process.

For instance, if a user starts to do an activity and access a page which has reference to a property, the player gets the data from the URL defined in the property. Then, the (human-readable) data will be shown in the user client in the way embedded on the page.

In another typical case, if a user initiates a service which refers to a property, the player will get the data from the URL defined in the property. Then, the data will be handled by the service.

Another possible and different case is related to a condition expression, in which the property is referred to, is evaluated. Then, the system will get the data from the URL defined in the property and the player will act differently according to the evaluation result.

This use case is extended to the one referring to the setup of a collaborative service.

Setup collaborative service

User sets up a collaborative service (e.g. forum, chat, MSN Messenger, Yahoo Messenger, Google Gtalk, Skype chat, AOL IM, IRC, ICQ) according to the definition of a UOL. The use cases related to the different collaborating services can be considered as natural extensions of this one.

Setup Forum

The user sets up a forum collaboration.

Setup Chat

The user sets up a chat collaboration.

Setup Messaging Clients

The user sets up a messaging collaboration (e.g. via MSN Messenger, Yahoo Messenger, Google Gtalk, Skype chat, AOL IM, IRC, ICQ).

Collaborate at runtime

Once a collaborative service has been set up during the run time process, the user chooses the appropriate client of the collaborative service s/he may need among the ones made available through the system GUI or the web browser used by the user.

Therefore, the user can communicate and/or collaborate with other learners by using the functions of the collaborative service until some specific conditions are met, e.g. scheduled time is over, an expected product has been submitted, or the activity is terminated.

The use cases related to the different collaborating services can be considered as natural extensions of this one.

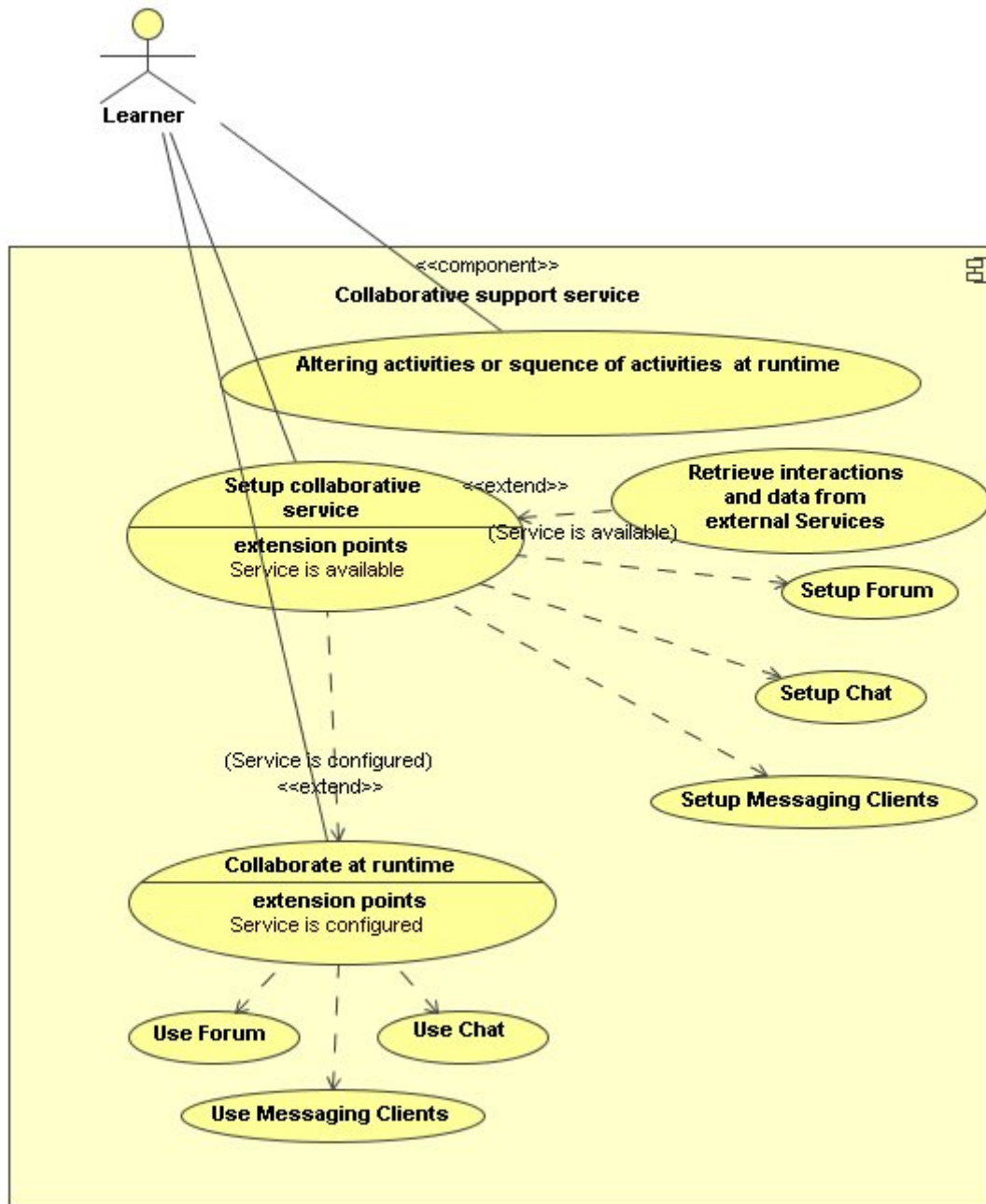
Use Forum

The user communicates through a forum service.

Use Chat

The user communicates through a chat service.

Additionally, other communication and collaboration services could be used (such as, blogs, wikis, etc.) with similar functionality to the chat/forum services, that is, setting up the service and using the service.



5.2.4 Knowledge Resources

The TENCompetence Knowledge Resources Sharing and Management (KRSM) system aims to provide the technological infrastructure for handling Knowledge Resources (KRs), that is, providing the Users with means for searching, retrieving, (re)using, storing, rating, and fostering creation processes of KRs.

In particular, the Users will be allowed to create KRs by launching the proper authoring tool via the TENCompetence GUI (see the ‘Authoring’ subsystem description for reference). The editing tool selection can be performed in different ways: by selecting it directly from the lists of the most used / rated ones, or from the resource category lists (e.g. authoring tools for creating Units of Learning, Units of Assessment, Competence Development Programmes, Learning Objects, text documents, spreadsheets, presentations); alternatively, it can be launched as a second step after selecting the resource type (e.g. Text, Image, Video, Presentation, Animation, Audio, UoL, UoA, CDP, CC), or the resource format (e.g. txt, pdf, odf, doc, rtf, mov, wmf, ram, avi, aif, jpg, gif, tiff, swf, ppt, xpf) first.

Via the Authoring subsystem the User will be able to perform also other basic tasks such as editing, deletion, import, export and duplication of a KR.

Of course, all these activities are subject to the validation of User’s privileges in terms of rights ownership to perform specific tasks.

Such validation applies also to other activities performed by Authors. In particular, storing resources into a repository and / or adding a new repository (see the ‘Storing’ module description for reference) require the User of being endowed with specific rights. Therefore, the User can directly select the resources currently in use to be stored in the local and / or remote repository onto which s/he has got right and that are displayed in the TENCompetence GUI.

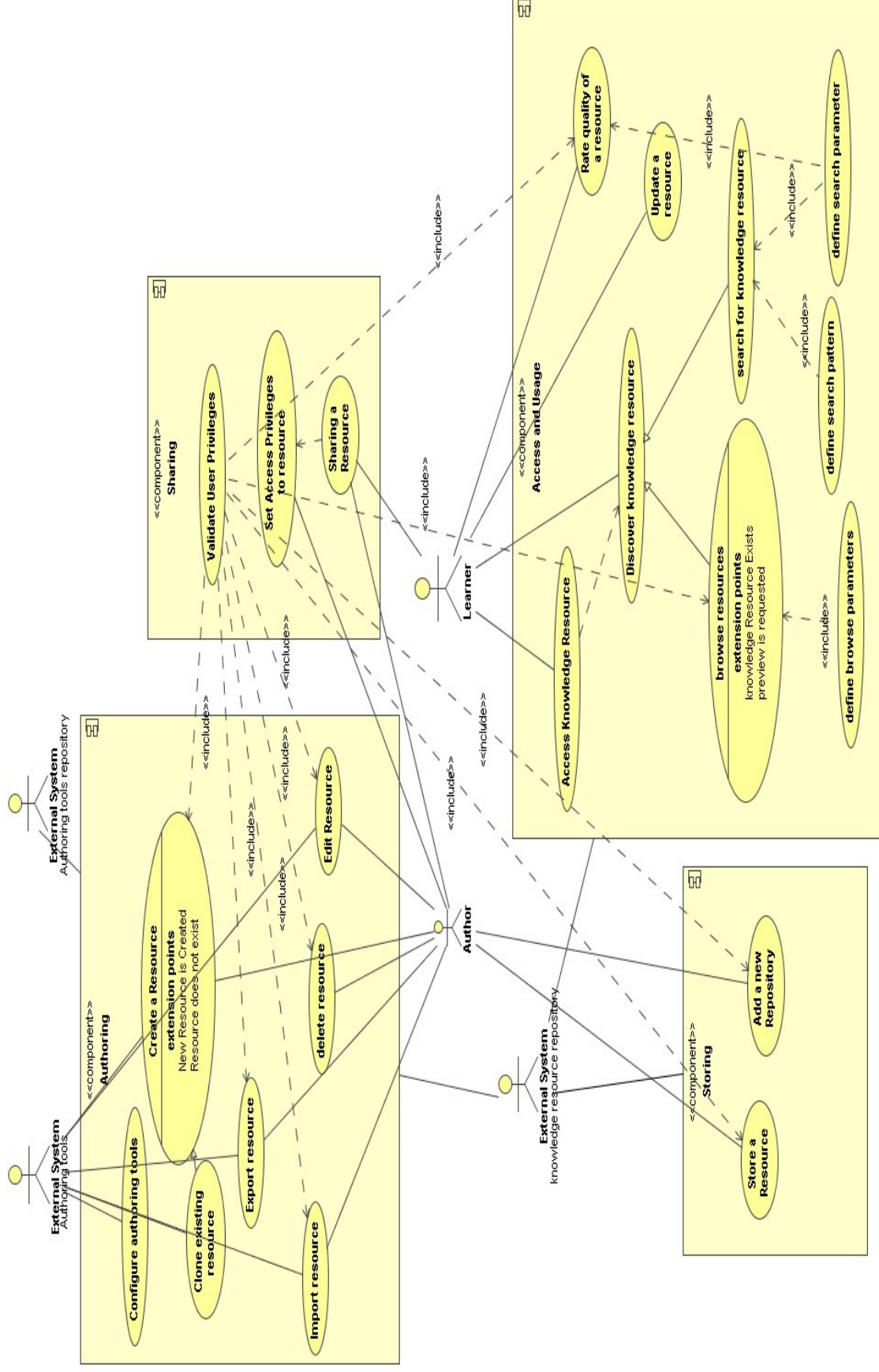
All the access (in terms of User category or specific Users) and permission rights associated to the resources (e.g. RWX) are handled by the ‘Sharing’ subsystem.

The main activities related to Learners concern search & retrieval and use of KRs (see the ‘Access and Usage’ module for reference). In particular, the search and retrieve part is quite flexible since it allows to perform very quick searches via the immediate access to the list of the ‘most recently used’ resources, as well as browsing on one or more repositories and specific pattern-driven queries. The latter include search by name, by format, by content pattern (whenever such editors are available) and by full text in search engines (e.g. Google). Moreover, not only Users can set on the resource preview facility, fixing the maximum number of returned results and of the ones that may be displayed at once, but they can also define other parameters for refining better the search in terms of Quality pattern (by setting quality rating patterns – e.g. only top rank resources to be considered), Sharing / Access permissions (e.g. only shared to all resources) and / or History activity (e.g. only the ones updated last week).

Another functionality is the possibility to rate the quality of a knowledge resource. Typically, the User can either entering a value or selecting a value in a Likert scale.

After any activity, knowledge resource's attribute related to the access is modified.
Therefore, the list of 'most recently used' resources is automatically updated.

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5.2.4.1 Authoring

The TENCompetence Authoring module will provide Users (i.e. the Authors) with the main functionalities for creating and modifying knowledge resources by accessing them from the user interface. The Authors will be also able to handle the resources in terms of importing, exporting and deleting activities.

In the following Users are Authors, if not differently specified. Moreover, please note that all the use cases but the one concerning the configuration of the authoring tools are subject to the validation of User's privileges in terms of rights ownership to perform specific activities (see for reference the Sharing subsystem description).

Configure authoring tools

As soon as an authoring tool is invoked by a User, a special settings configuration mechanism is triggered in order to provide effective fruition. For instance, if the author is working with a mobile device, the size of the knowledge resource to be handled, can not exceed a fixed value.

This function can not be accessed by the Author directly from the TENCompetence GUI since the current use case refers to the automatic settings that are depending on the context-of-use (e.g. mobile and / or mobility scenarios). Therefore, the normal authoring tool configuration settings that involve User's decisions on options and preferences are out-of-scope since they can be performed without any relation with the TENCompetence KRSM system and, more in general, with the TENCompetence client.

Clone existing resource

The knowledge resource in use can be duplicated, e.g. in order to perform some changes / modification on a resource copy in a safe way (i.e. without affecting it directly as in a sandbox system), the resource can be cloned via the TENCompetence GUI by selecting the proper authoring tool in the 'Create' page. The list of 'most recently used' resources is updated too.

Create a resource

The User that needs a new (knowledge) resource opens the TENCompetence GUI in the 'Create' page and creates it according to different means, e.g. by selecting the proper resource editor or by selecting the resource kind and / or format.

In the latter case, a suitable list of tools (i.e. the resource editors) by which the resource can be produced is offered to the User.

Therefore, an updated list of resources authoring tools and one for the resources formats is made available and accessible via KRSM system. The lists should be ordered according to a reasonable criteria (e.g. Users preferences, appropriateness)

Then the editor is loaded, opened and the resource is created.

The new resource is loaded into the KRSM system and the 'most recently used' resources list is updated.

Extensions

Just in case there are not tools available to perform the creation task for the needed resources (e.g. the User selects the resource desired format and the KRSM returns no results available, that is, no tools available that can be associated to the selected resource

format), the KRSM should be able to suggest an alternative resource format (e.g. no .mov editors available, but .avi ones) and / or to download and install a proper tool. Another exception case foresees invoking the proper authoring tool for modifying an already existing resource.

Import resource

This function is meant to load a resource in order to make it available for further processing (e.g. editing, deleting). In fact, it can be invoked both in the 'Create' and in the 'Properties' pages. The list of 'most recently used' resources is updated too.

Edit resource

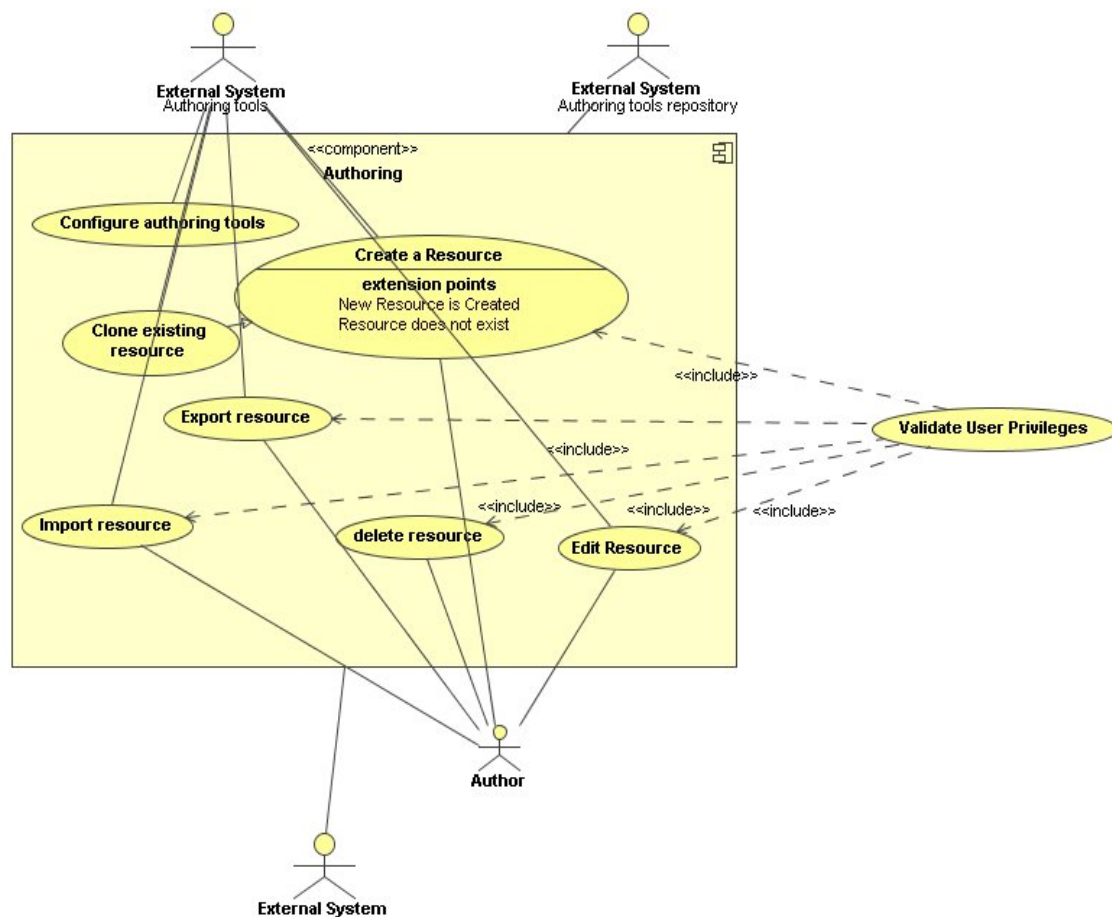
The User may modify the resource by invoking the proper authoring tool via the TENCompetence GUI in the 'Create' page. In this way a new resource is created. The list of 'most recently used' resources is updated too.

Export resource

A knowledge resource can be exported in a different format from the original one. In order to perform this task the User has to select the resource in use listed in the TENCompetence 'Create' page and use the 'Export' function. In this way the resource is exported and a new one is created. (i.e. the exported resource, that is the resource in the new format, is a new resource. In other words: the original resource once exported doesn't disappear, but a new one in a different format – the one used for the exporting – is available). Therefore, the list of 'most recently used' resources is updated too.

Delete resource

The User can delete a resource by selecting it in the 'Properties' page available in the TENCompetence GUI.



5.2.4.2 *Sharing*

The TENCompetence Sharing module will provide users (i.e. the Learners and Authors) with the capability of sharing the resources they are allowed to access. In this subsystem, the access privileges are set and validated too. Therefore, the use cases here presented affect also Authors' and Learners' behaviours by preventing them from forbidden activities (e.g. editing or rating a resource without being provided with the proper permission right).

Sharing a resource

This use case depends on the following one 'Set Access Privileges to resource' and is related to User's capability of setting the access right to a resource and optionally the specific permissions rights e.g. RWX, associated to the resource.

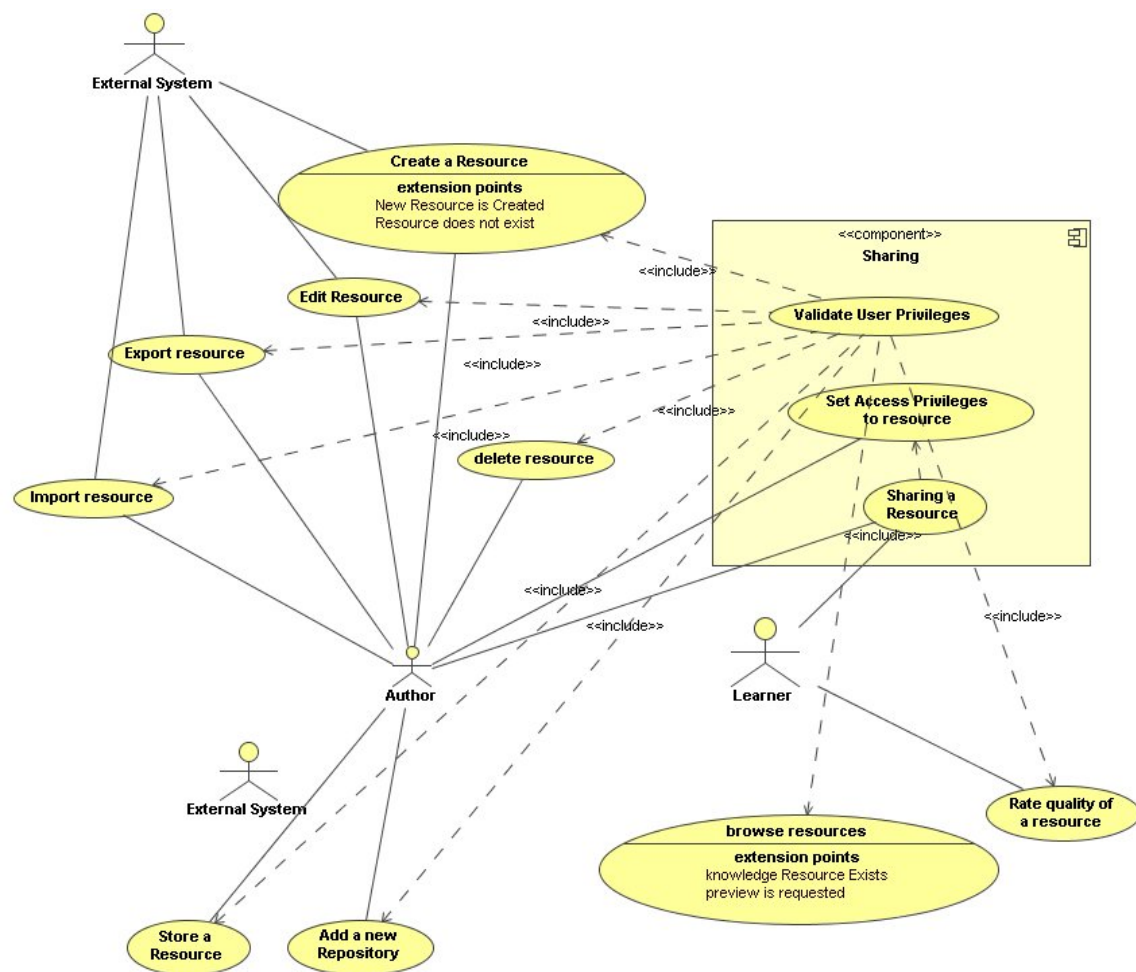
The access to the resource is then modified and the list of 'most recently used' resources updated too.

Set Access Privileges to resource

In the 'Properties' page of the TENCompetence GUI it is possible to set the access rights to a resource by selecting the kind of User or by entering a specific User name. Moreover, the User can set the permission rights (e.g. RWX) associated to a resource. The access to the resource is then modified and the list of 'most recently used' resources updated too.

Validate User Privileges

This use case foresees the validation of the access privileges of a resource for a given User within her/his context. Therefore, it affects several activities related to Authoring, Storing and Access and Usage of knowledge resources.



5.2.4.3 Storing

The TENCompetence Storing module will allow Users (i.e. the Authors) to store resources in a repository and to handle with some administrative issues such as addition of a repository to the list of the accessible ones.

In the following Users are Authors, if not differently specified.

Store a resource

In order to perform this task the User opens the ‘Store’ page in the TENCompetence GUI.

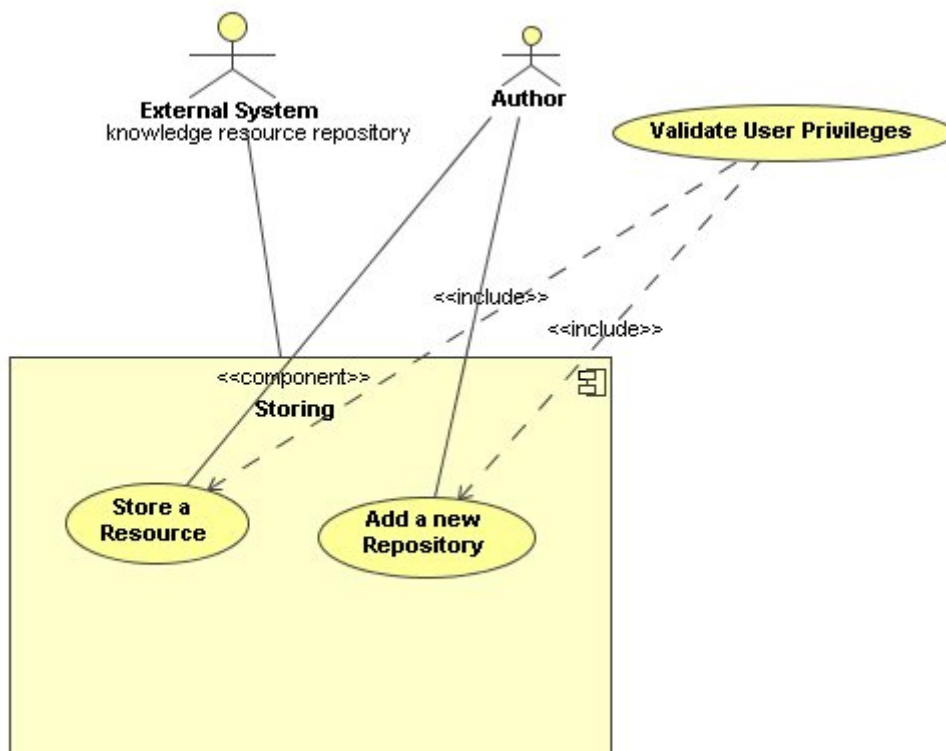
The resource can be stored into a local file system (e.g. the User’s one) or into a remote repository.

The KRSM system makes available all the repositories (local and remote) to which the User is allowed to access. Therefore, the User is able to select a repository (or more than one, in case of multiple storage – resource replication on different repositories could be useful for speeding up resource retrieval and / or creation) from a list and / or a map of repositories.

The KRSM system should be able to monitor the system’s Storage capacity too.

Add a new repository

The User can add a new repository by accessing the ‘Administration’ page of the TENCompetence GUI. By adding the new repository, the list of available repositories will be updated and provided in the ‘Store’ page.



5.2.4.4 Access and Usage

The TENCompetence Access and Usage module will let Users (i.e. the Learners and Authors) access and use the knowledge resources. Therefore, all activities concerning knowledge resources search and retrieval are managed by this module as well as the ones related to their update and rating.

Access Knowledge Resource

The Learner that needs a knowledge resource opens the ‘Open / search’ page in the TENCompetence GUI and chooses the way of looking for the resource according to the ‘Discover knowledge resource’ use case. At the end of the process the resource is retrieved and available for further use.

Discover knowledge resource

The User has got three main ways of finding out the resources s/he may need: by accessing to the most recently used resources list, by browsing knowledge resources repositories, or by selecting some search patterns and parameters. They will be detailed in the following sections ‘Browse resources’ and ‘Search for knowledge resource’.

Browse resources

Once the User has entered the ‘Open / search’ page in order to look for the needed resource, s/he can select one specific repository onto which perform the research or, alternatively, to perform an extended query to all the available repositories. After the User has selected the repositories and launched the search, a set of resources is returned. The User may also set the number of results returned and of the ones to be displayed at once, and ask for previewing them. The list of ‘most recently used’ resources is updated too.

Extensions

Just in case the resource doesn’t exist, the User can create it by accessing the ‘Create’ page in the TENCompetence GUI (see the related ‘Authoring’ subsystem description and, in particular, the ‘Create a Resource’ use case for reference). Otherwise, if the resource exist and is not easily searchable via repositories browsing, the Learner can launch the ‘Search by...’ option in the ‘Open / search’ page.

Define browse parameters

Peculiar of this function included in the previous one (i.e. ‘Browse resources’) is the setting of a generalised search over all the repositories made available to the User. The User can set some additional browse parameters too.

Search for knowledge resource

Alternatively to retrieving resources by repositories browsing the User can choose to select one of the ‘most recently used’ resources listed in the ‘Open / Search’ page of the TENCompetence GUI, or to perform this task according to specific search pattern, as described in the ‘Define search pattern’ use case here included.

Moreover, other than setting on the resource preview, or fixing the maximum number of returned results and of the ones that may be displayed at once, the Learner can also define other parameters as the ones detailed in the ‘Define search parameter’ use case here included.

Again, the result of this operation is that the resource/s is/are retrieved and directly accessible to the User.

The list of ‘most recently used’ resources is updated too.

Define search pattern

This use case is included in the previous one since describes what search patterns can be chosen by Users. That is, searching by name (so that the User enters the name, or part of it, of the resource), by format (that is, resource format is chosen for driving the search), by content pattern (in this case, some specific pattern is entered according to the resource kind – e.g. if a simple graphic editor is available, the content pattern could be a sketch or a colour combination), or by keywords and / or full text via Search engine (e.g. Google, Vivisimo, Clusty, Kartoo).

As a result, the resource/s is/are retrieved and directly accessible to the User.

The list of ‘most recently used’ resources is updated too.

Define search parameter

This use case is included in the one related to the ‘Search for knowledge resource’ too. In particular, the Learner is provided with the possibility of setting additional parameters in order to refine the search, so that along with setting on the resource preview, or fixing the maximum number of returned results and of the ones that may be displayed at once, the Learner can also define a Quality pattern (e.g. only top rank resources to be considered), Sharing / Access permissions (e.g. only shared to all resources) and / or the History activity (e.g. only the ones updated last week).

Update a resource

Each time a User interacts with a knowledge resource (e.g. by modifying it, by accessing it) the latter is updated. Then, the list of ‘most recently used’ resources is updated too. Please note that just the fact of accessing the resource itself results in an update since at least the attribute related to the access to the resource is modified and updated, and will affect the list of ‘most recently used’ resources.

Rate a quality of a resource

The Learner can set the quality rate of a knowledge resource s/he is allowed to access in two ways: by entering a value in a proper field (where range values are provided by the KRSM GUI), or by selecting the value from a list (e.g. a value in a Likert scale).

Once the Learner has provided her/his feedback, the value is stored and associated to the resource.

Since the access to the resource has been modified, the list of ‘most recently used’ resources is updated too.



5.3 Pilot Description

5.3.1 Virtual Classroom and Group Collaboration

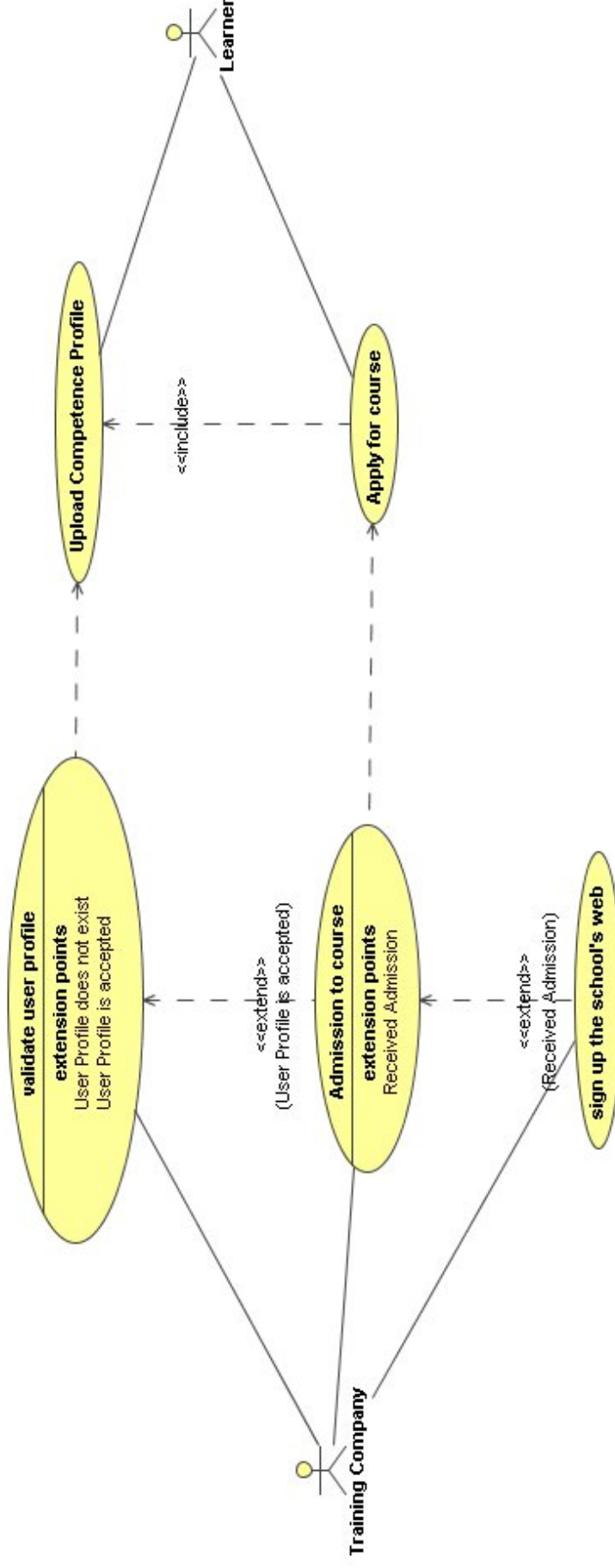
5.3.1.1 Learner subscription

This use case scenario contains two actors:

- Learners
- Training Company

The objective of this scenario is the formal acceptance and subscription of learners to the online training facilities of a digital film school.

Learners have to upload their competence profile in order to apply for courses at the digital film school. This profile is validated by the training company in charge for the course delivery. If the competence profile is accepted, the training company will check the application for the course. If all prerequisites for the requested course are met, the learners are signed up to the school's web based learning environment.



5.3.1.2 *Virtual classroom*

This use case scenario contains two main roles:

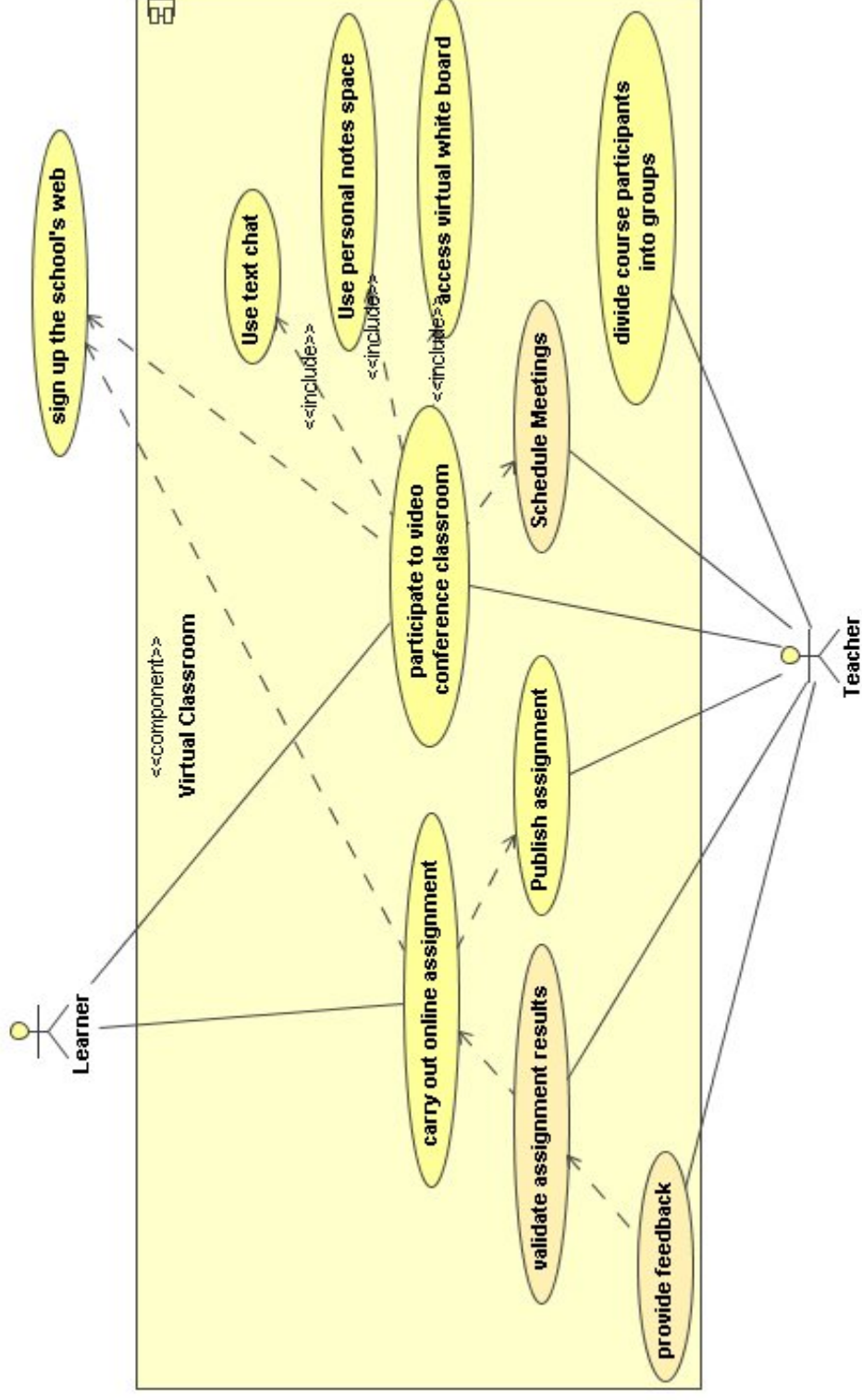
- Learners
- Training Facilitators

The objective of this scenario is basic instruction and training of how to use a digital cinema film set using a virtual classroom. The prerequisite of this scenario is the assignment to the digital film school's web based learning environment.

The participation to the course is split into video conferences in the virtual classroom environment and online assignments.

The participation to the video conference allows the learners and the training facilitator to discuss techniques and learning outcomes. Additionally to the video conferencing the conferencing environment provides a personal note taking space, a virtual whiteboard, and a text chat. These weekly meetings are scheduled by the training facilitator.

Online assignments are provided by the training facilitator. The trainer has to publish the assignments to the learning environment. As soon the assignments are made available the learners can carry out the assignments and submit their results to the training facilitator. These results have to be validated by the trainers, who also can provide feedback in order to support the learners.



5.3.1.3 *Group collaboration*

This use case scenario has two roles:

- Learners
- External users (Film actors)

The objective of this scenario is to create a film using a digital film set in a collaborative process. The prerequisite of the use cases is that all learners were assigned to a group by a trainer in a virtual classroom environment.

The group collaboration environment contains two main parts: a conferencing system and a web based workspace.

The conferencing system is used for the decision which virtual set to use and for direct communication between learners and external users during the shooting of the film.

The web based environment has to support the users to access low and high quality versions of the film material; provide appropriate tools to organise the storyboard and the production script; as well as the tools to manipulate the film material during the finalisation phase of the film production. Finally, the web based workspace has to support the learners during administrative tasks such as signing up for the film set facilities or to assign tasks among each other.



5.3.2 Blended Learning

This use case scenario has two acting roles:

- Learners
- Service Provider

The objective of this scenario is to develop skills and knowledge to operate a digital camera.

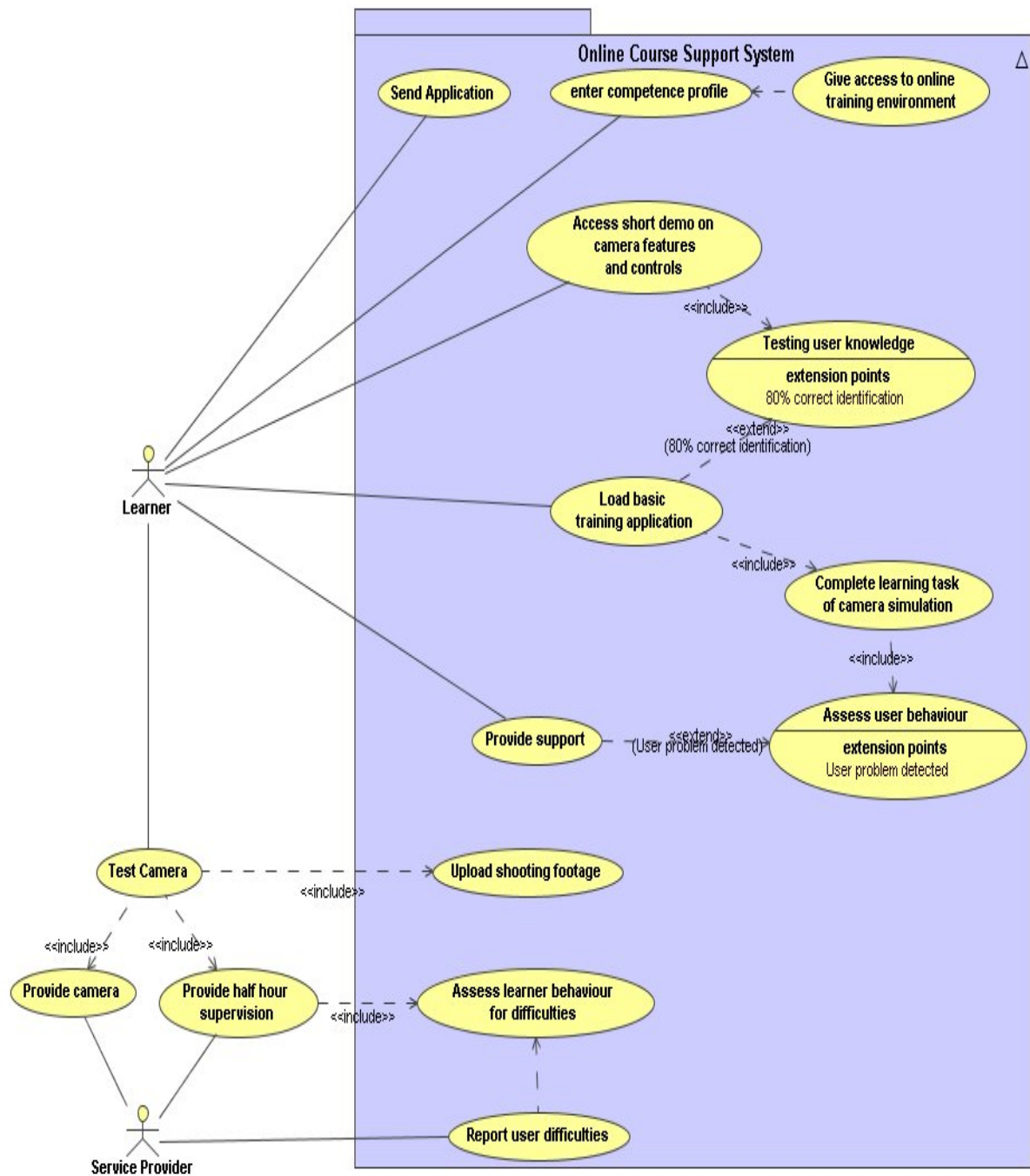
The prerequisites for this scenario are that the learners send an online application to the course providers and that they enter their competence profile to the online course support system. After meeting these prerequisites the learners get access to the online training environment.

Before the learners can access a real camera they have to follow a short introduction about the functions, features and controls of the camera. This introduction includes a test of the learner's knowledge.

Only learners who pass the test with 80% of correct identification are allowed to proceed with the programme. The basic training contains a camera simulation which is used for a complete learning task. Within that simulation the learner's behaviour is assessed. When the system detects a learner problem it provides some support to the learners.

After passing the learning task the learner is allowed to test a real camera. The cameras are provided by professional service providers (e.g. cinema equipment rentals). The user behaviour as well as the results are collected during the camera test and uploaded as the shooting footage to the online course support system.

The camera test includes 30 minutes supervision on the usage of the camera. During this supervision the service provider assesses the learner's behaviour for difficulties with the camera equipment. This observation is reported back to the online course support system.



6 Non-Functional Requirements

6.1 Introduction

6.1.1 Purpose

The goal of this part of the document is to provide the non functional requirements for the TENCompetence system. These requirements give direction to the analysis and design.

6.1.2 Scope

The requirements apply to the final system as it will be created by WP3, they don't apply to the cycle 1 system. This part of the document also contains a number of requirements for the WP5-8 software, but the full list for that software is in the requirement documents of those work packages.

6.2 Specific Requirements

6.2.1 Functionality

6.2.1.1 Suitability

6.2.1.1.1 Client versions

- Both a browser and a desktop client have to be developed (Ruud Lemmers).
- The target browsers for the browser version are Microsoft Internet Explorer 6+ and Mozilla Firefox 1.5.0+ (Paul Sharples, 7-11-2006).

6.2.1.2 Accuracy

- The minimum supported screen resolution is 1024 x 768 (Ayman Moghniegh, 14-09-2006 / Eleni Boursinou, 11-08-2006 / Arne Koesling, 15-08-2006)

6.2.1.3 Availability

6.2.1.3.1 Availability of data

- The system should support logical deletion of data, to enable restoring deleted data. This prevents permanently destroying data or making repositories unavailable by accident (Panagiotis Zervas, 31-10-2006).
- When data is no longer needed, it should be stored for another year (as backup). After this year, the data should be deleted (Ruud Lemmers, 19-11-2006).
- The user should be able to clean up information, that was logged for personalization (Arne Koesling, 15-08-2006).

6.2.1.3.2 Availability of the system

- The availability of the system, excluding planned downtime, has to be at least 99.7% (meaning 5 minutes unplanned downtime per day) (Ruud Lemmers).
- Planned downtime should not occur more than once every month (Ruud Lemmers, 19-11-2006).

6.2.1.3.3 Availability to users

- All users willing to register should be allowed to use the system (Ruud Lemmers, 19-11-2006).
- An administrator should be responsible for the maintenance and the proper operation of the System (Panagiotis Zervas, 31-10-2006).

6.2.1.3.4 Resource access

- It should be possible to allow access to certain resources or actions to a specific set of paying students and their teachers / tutors / course designers / ... (Ayman Moghniegh, 14-09-2006).
- It should be possible to allow access to certain resources or actions for a limited duration (Ayman Moghniegh, 14-09-2006).

6.2.1.4 *Security*

6.2.1.4.1 Data storage

- E-portfolio information should be stored in a secure way (Arne Koesling, 15-08-2006).
- By default all information published in the context of social software is public (Eleni Boursinou, 11-08-2006).
- Information published in the social software parts is not sensitive (Eleni Boursinou, 11-08-2006).

6.2.1.4.2 Secure data transmittal

- E-portfolio data is sensitive and has to be transmitted in a safe way (Arne Koesling, 15-08-2006).

6.2.1.4.3 Encrypted storage of passwords

- User passwords for enabling automatic login in external systems have to be stored encrypted (Panagiotis Zervas, 31-10-2006).
- User passwords for the TENCompetence clients should not be stored, only their hash values (Ruud Lemmers, 19-11-2006).

6.2.2 Usability

6.2.2.1 *Attractiveness*

6.2.2.1.1 Flexible user interface

- The user interface should be flexible enough to allow and / or foresee future use in different contexts and delivery modes as, e.g., not only web GUIs can be devised but also Tangible User Interfaces (Marco Luccini 03-08-2006).

6.2.2.1.2 Fancy and easy to use user interface

- The focus is on a "fancy and easy to use application". A good working system is more important than additional functionality (Eleni Boursinou).

6.2.2.2 *Understandability*

6.2.2.2.1 Infrastructure

- To develop an easy-to-use, integrated, extensible and sustainable European infrastructure for lifelong competence development, beneficial to individuals, groups and organizations (project plan, page 10).

6.2.2.3 *Usability compliance*

6.2.2.3.1 Language support for operators

- The system has to be able to show all texts to operators in English.

6.2.2.3.2 Multilingual support for users

- The system has to be able to show all texts to learners and teachers in multiple languages. Providing content in multiple languages is up to the content creators (Ruud Lemmers, 20-11-2006).
- The system texts (error messages, menus, button labels, etc.) should be provided by the system in at least Bulgarian, Dutch, English, French, German, Greek, Italian and Spanish (Ruud Lemmers, 20-11-2006).

6.2.2.3.3 Internationalization Support

- The system has to support internationalization: a user should see the separators, date/number format masks, etc. that are standard for his/her country (Ruud Lemmers).

6.2.2.4 Operability

6.2.2.4.1 Support for different groups of users

- The user interface has to support learners, teachers, content creators, administrators, etc. and should provide views on the content and intuitive overviews based on their rights.
- In other words, according to the kind of user some activities are allowed and some are forbidden, depending on the rights of the user in accessing the content itself and/or the repositories where the content is stored. Only the GUI items (buttons etc.) for allowed actions should be shown (Arne Koesling).

6.2.2.4.2 Reconciling designed learning units

- The system should provide a consistent view on learning units, even when defined by authors with different styles (e.g. with respect to course setup, length, pedagogical strategies, GUI design) (Arne Koesling).

6.2.2.4.3 Individualized views

- The user interface should be adaptable to user's needs provided that the standard features should always be restorable (Arne Koesling).
- Individualized views should remain recognizable by other users. This prevents miscommunication between learners, peers and teachers in their collaboration (Arne Koesling).

6.2.2.4.4 Metadata editing

- Users shouldn't be bothered too much with explicit metadata editing. Like other data (usage data, management data), metadata should be collected as implicitly as possible (Arne Koesling).

6.2.2.4.5 Offline functionality in desktop client

- The desktop client has to be able to work both with and without an internet connection (but note that less functionality will be available off line) (Ruud Lemmers).

6.2.2.4.6 Identity of users

- The identity of a course designer always has to be available to users of a course (Ayman Moghniegh, 14-09-2006).
- Users should be able to hide their identity from other users or user groups when supplying a response to a question or resource. Only administrative users should be able to identify them in these cases (for moderation purposes) (Ayman Moghniegh, 14-09-2006).

6.2.2.4.7 Granting permission

- Users should very seldom be asked to grant the system access to their information (Arne Koesling, 15-08-2006).

6.2.3 Reliability

6.2.3.1 Maturity

6.2.3.1.1 Stability of the user interface

- Changes in the system must not completely change the view of the users on the system to avoid confusion. The user must stay able to work on his planned activities and the system should keep track of the changes in the system to give the user a better overview (Arne Koesling).

6.2.3.2 Robustness (*fault-tolerance*)

- When hardware breaks, other systems have to take over (redundancy in the hardware) (Ruud Lemmers).

6.2.3.3 Recoverability

6.2.3.3.1 Rollbacks

- An action is either fully completed (for successful scenarios) or fully rolled back (for failed scenarios). When an action was rolled back, this always has to be communicated to the user (Ruud Lemmers).

6.2.3.3.2 Recoverability

- The system has to be monitor if its components are still running. If components are down, the system should be able to restart them without needing a manual action from an operator (Ruud Lemmers).

6.2.3.3.3 Synchronization of data

- When a user is working on line, he/she should be warned when committing actions on obsolete data and further actions using that data should be prevented (Arne Koesling).

6.2.3.3.4 Backups

- It should be possible to do backups without bringing parts of the system down (Ruud Lemmers).

6.2.4 Performance

6.2.4.1 Time behaviour

6.2.4.1.1 Real time and off line computation

Note: users should have a download speed of at least 512 Kbit/second. Users with a slower connection could experience longer response times than the ones mentioned below.

- On average, a response from the system to user inputs should take 5 seconds or less.
- Actions taking more than 20 seconds will be scheduled off line. The user will receive a notification of the result (Ruud Lemmers, 19-11-2006).
- Actions taking more than 5 seconds on average should have some kind of indicator,

to notify the user that the action is expected to take between 5 and 20 seconds (Ruud Lemmers, 19-11-2006).

- Actions taking 5 seconds or less are synchronous. The system proceeds when the result for the action has been received (Ruud Lemmers, 19-11-2006).

6.2.4.2 *Resource behaviour*

6.2.4.2.1 Infrastructure

- The infrastructure should be widely accessible (free of charge) and user-friendly (project plan, page 14).

6.2.4.2.2 Preview of resources

- Previewing of resources should be disabled by default in order to speed up system response time (e.g. loading a resource player can be heavy in terms of system workload in a mobile scenario). Each user should be able to change this default from “disabled” to “enabled” for himself/herself (Marco Luccini 03-08-2006).

6.2.4.3 *Number of concurrent users*

1. Resource servers: if bandwidth ≥ 20 Mbit/s, memory ≥ 4 GB and processing power is at least the same as a powerful desktop, then the maximum number of supported concurrent users of a server should be $\geq \dots$
2. User profile servers: if bandwidth ≥ 10 Mbit/s and processing power is at least the same as a powerful desktop, then the maximum number of supported concurrent users of a server should be ≥ 500
3. Learning network servers (where the learning network, competences, CDPs etc. are stored): if bandwidth ≥ 10 Mbit/s and processing power is at least the same as a powerful desktop, then the maximum number of supported concurrent users of a server should be ≥ 250

For 1), 2) and 3) goes that adding parallel servers should increase the supported number of concurrent users (Ruud Lemmers, 30-11-2006).

6.2.5 **Supportability**

6.2.5.1 *Analyzability*

- There should be moderation of content to assure good quality of the content and to prevent abuse (Ayman Moghniegh, 14-09-2006 / Eleni Boursinou, 11-08-2006 / Arne Koesling, 15-08-2006).

6.2.5.2 *Testability*

6.2.5.2.1 Logging

- Logged actions should contain the ID of the user that performed the action (Ruud Lemmers).
- For maintenance and support purposes, components should log information about their execution (Ruud Lemmers).
- Every communication from a client to a server is logged on the server (Ruud Lem-

mers).

- All create, read, update and delete actions from users need to be logged, for the purpose of usage analysis, personalization and assessment auditing (Ayman Moghniegh, 14-09-2006 / Arne Koesling, 15-08-2006).
- The level of logging detail should be configurable. The setting should be updatable while the system is running (Ruud Lemmers, 20-11-2006).

6.2.5.3 Maintenance compliance

- An installation and configuration procedure should be written for each component (Ruud Lemmers).
- The external interfaces of components have to be specified in detail (to enable easy replacement of a component by an alternative implementation) (Ruud Lemmers).
- Software documentation, installation and configuration procedures, interface descriptions all have to be available in English. Additional languages are optional (Ruud Lemmers).
- All information entered in a version of the system has to be available in later versions of the system (because the Digital Cinema pilot will keep on running, throwing away its data is not acceptable) (Ayman Moghniegh, 14-09-2006).
- All tools, applications and components that require integration in the TENCompetence system, should provide well-documented interfaces through web services, consistent of naming schemes for classes, methods and attributes, and inline documentation for all source code (project plan, page 29).

6.2.5.4 Adaptability

- The coding standards as provided by WP3 should be followed (Ruud Lemmers, 19-11-2006).
- We will support European countries. Users from other countries might be able to use the system too, but we don't do specific work to support them. E.g. we are not adapting the system to support the Chinese language (Ayman Moghniegh, 14-09-2006) / Eleni Boursinou, 11-08-2006 / Arne Koesling, 15-08-2006).
- It should be easy to integrate functionality of external search engines (e.g. Google) and meta search engines (e.g. Vivisimo, Clusty) for searching resources.
- The system should be self-sustainable (Rob Koper, 9-2-2006):
 - a) no-one should own the system
 - b) everybody should be able to make a small or larger server installation
 - c) servers should automatically be federated and expand the total server capacity (the servers act as a peer-to-peer system or a kind of GRID).

6.2.6 Design Constraints

6.2.6.1 Previous version

- Only the latest version of the software is supported. Users should be able to automatically update to the current version (Arne Koesling, 15-08-2006).

6.2.6.2 VNC

- The VNC component (for sharing screens) should be integrated in the system (Ayman Moghniegh, 14-09-2006).

6.2.6.3 Availability of authoring tools / knowledge editors

- The system should enable authoring for all types of KRs storable in the system. The authoring functionality could be offered by integrated authoring tools, by external authoring tools or by a mix of both (Marco Luccini 03-08-2006).
- The list of available authoring tools should be provided as an input to the system (Marco Luccini 03-08-2006).
- The interfaces between available authoring tools and the system should be developed and provided (Marco Luccini 03-08-2006).

6.2.6.4 Defaulting / privileged authoring tools

- The authoring tools offered directly by the system should be displayed as preferred options. In particular, these editors should be the ones developed within the project framework (e.g. editors for UoL, learning activities, learning paths) (Marco Luccini 03-08-2006).

6.2.6.5 Multiplatform

- The system has to be able to run on a number of different operating systems, among which at least MS Windows, Unix, Linux and Apple Mac OS platforms (Marco Luccini / Ruud Lemmers 03-08-2006).

6.2.6.6 User authorization and authentication mechanisms

- The User authorization and authentication mechanisms (e.g. in order to perform Administration activities) should be provided by the overall TENCompetence system (Marco Luccini 03-08-2006).

6.2.6.7 Metadata of resources

- The system should at least offer (pre)views of resources' metadata. The addition, change and deletion of resources metadata could be performed by the authoring tools / resource editors (Marco Luccini / Ruud Lemmers 03-08-2006).

6.2.6.8 Storage capacity

- Storage capacity can affect normal storage activities. A two level threshold should be taken into account:
 - 1) a 'loose' one, set by the system, that can be set by the User and
 - 2) a strict and fixed one, set by the operating system, that cannot be overstepped for system's safety reasons.

The user can set the first one up to the limit of the latter (Marco Luccini 03-08-2006).

6.2.6.9 *Caching of resources*

- Caching of resources, both server and client side, should be implemented if it provides a significant performance gain. If caching is implemented, the duration of storage for a resource and the maximum size of memory and disk space for the cache should be configurable (Marco Luccini/Ruud Lemmers, 9-11-2006).

6.2.6.10 *Contribution to e-framework*

- The project will commit and contribute to JISC's e-framework where possible (project plan, page 26).

6.2.6.11 *Service Oriented Architecture*

- The infrastructure will be based on a Service Oriented Architecture (project plan, page 26).

6.2.6.12 *Design according to architecture*

- All new developments should be designed in accordance to requirements that follow from the architecture (project plan, page 29).

6.2.6.13 *Management model*

- TENCompetence should provide software solutions to establish a decentralized, self organised and empowered management model when using the TENCompetence infrastructure (project plan, page 6).

6.2.6.14 *Integration of tools*

- TENCompetence will integrate isolated tools that are available in the field [of Knowledge Management, HRM and e-learning] “within a common framework” (project plan, page 6).

6.2.6.15 *Advertisements*

- No information shall be used for advertisements (Eleni Boursinou, 11-08-2006).

6.2.7 **On-line User Documentation and Help System Requirements**

6.2.7.1 *Online support*

- Support should be available online and also context based and not just inline in the client. Context based help is a necessity to keep the user exploring functions (Arne Koesling).

6.2.7.2 *Help information*

- Teachers and course designers should be able to get support on creating and editing CDPs, units of learning, etc. This makes it easier for them to create good quality material and thus stimulates to share knowledge (Ruud Lemmers, 19-11-2006).
- The Help System must be intuitive. Clear structure. Must not be too time consuming for learner to use (Arne Koesling).
- Users should be able to get "help on demand" when they have a problem in using the system (Ayman Moghniegh, 14-09-2006).
- Help by an agent is only allowed if it is ambient and calm. It should not distract a learner from his activities (Ayman Moghniegh, 14-09-2006).
- The user should be able to indicate what the stimulus agent can help with (Eleni Boursinou, 11-08-2006).
- Help information should be according to the needs and rights of a user. E.g. course designers, teachers and system administrators could get different help for similar problems. (Marco Luccini/Ruud Lemmers 03-08-2006)

6.2.7.3 *Training*

- The basic functionality of the system should be usable without training (Eleni Boursinou, 11-08-2006 / Arne Koesling, 16-11-2006).
- It is OK if users need an introductory course before they are fully capable to use the TENCompetence system (Ayman Moghniegh, 14-09-2006).

6.2.8 **Purchased Components**

6.2.8.1 *No commercial components in the base system*

- Components that are brought into the project with a commercial licence will not be integral parts of the infrastructure, but will be positioned as optional components that can interoperate with the other components to serve some specific, but optional functions (project plan, page 20).

6.2.9 **Interfaces**

6.2.9.1.1 *Personalized views*

- The User Interface should allow settings customization, e.g. character size, font, foreground vs. background colours, window size, icon size, scrolling, menu bar settings (e.g. icons only, text only, icons and text), skin (Marco Luccini 03-08-2006).

6.2.9.2 *Hardware Interfaces*

6.2.9.3 *Software Interfaces*

6.2.9.3.1 *Interfaces to institutions*

- Connection to existing systems in universities offering courses (in Germany e.g. the "university information system / Hochschul-Informationssystem (HIS)). HIS SOS,

HIS LFS and StudIP a.s.o (Arne Koesling).

- There is a need for the following interfaces (Arne Koesling):
 - a) an interface to Institutions, to exchange info about Competences + proofs and
 - b) an interface for profile management.

6.2.10 Licensing Requirements

6.2.10.1 *Open Source license*

- The tools developed in the project have to be provided as Open Source Software (project plan, page 19).
- All software output of work is licensed under an OSI certified Open Source agreement that promotes their reuse, such as the GNU GPL and the GNU LGPL (project plan, page 28).
- All core functionalities (at least) should be covered by Open Source components, which are sufficient to set up the entire system. This restriction does not apply to optional components which may enhance the TENCompetence system but can be left out without compromising its basic functionality (project plan, page 29).

6.2.10.2 *Software available without charge or fee*

- All software developed in the project will be made freely available to the broader community without any charge or fee (project plan, page 28), this also includes the games offered as part of the TENCompetence system (Eleni Boursinou, 11-08-2006).

6.2.10.3 *Authoring tools licensing*

- The system should not be affected by the licensing policies related to any of the tools (e.g. the authoring tools) that can be invoked by the system itself (Marco Lucini / Ruud Lemmers 03-08-2006).

6.2.11 Legal, Copyright, and Other Notices

- When existing software is reused and / or extended, the legal and copyright notices as required by the license of the original software should be included (Ruud Lemmers, 19-11-2006).

6.2.12 Applicable Standards

6.2.12.1 *Open standards*

- Open standards should be used within a joint open architectural framework for all the tools developed (project plan, page 19).

6.2.12.2 *Use of relevant standards and specifications*

- All software that is developed in the project should meet the following criteria: use of relevant standards and specifications whenever possible, such as SOAP, UDDI, XML, XSLT, RSS, RDF, IMS LD, IMS CP, IMS QTI, IEEE LOM, etc (project plan, page 28).

6.2.12.3 *Uniquely identifiable resources*

- Each KR must be uniquely identifiable using worldwide unique identifiers and metadata descriptors (e.g. in the LOM or Dublin Core format depending on the resource) (project plan, page 37).

6.2.12.4 *Content package specification*

- Content packages must conform to the IMS Content Packaging specification or SCORM (project plan, page 37).

6.2.12.5 *Standards-based functionality*

- The system should have a standards-based set of components supporting the creation, storage, use, reuse and exchange of KRs (project plan, page 40).
- These components should be embedded in an environment of many thousands of KRs available in a variety of repositories (through the liaisons) (project plan, page 40).

6.2.12.6 *Specifications and standards for KRSM*

- A (lightweight) profile of specifications and standards to facilitate KRSM should be delivered (project plan, page 40).

6.2.12.7 *Learning path description specification*

- A learning path description specification should be provided, that can be used to describe competence development programmes in a formal, semantic, computer interpretable, and interoperable way. This will be provided as input to standardization (project plan, page 48).

6.2.12.8 *Conformance to Usability and Accessibility standards*

- The W3C WAI specifications for accessibility should be met (e.g. in order to meet visually impaired people needs) (Marco Luccini).
- Games should be offered only as a secondary tool for gaining skills / knowledge. Thus disabled people who can't play a certain game will have another way to gain these skills / this knowledge (Eleni Boursinou, 11-08-2006).

6.2.12.9 *SCORM 1.2*

- The system should be able to play SCORM 1.2 Scos (Sharable Content Objects) (Paul Sharples, 7-11-2006).
- SCORM 1.2 content should be embedded within an IMS Learning Design Manifest (Paul Sharples, 7-11-2006).
- A Unit of Learning which contains SCORM content, must also include the correct resources to enable it to be played. This means that any Javascript/adaptor files referenced by the Sco itself, must also be included as part of the zip file or exploded folder structure (Paul Sharples, 7-11-2006).
- Playing SCORM content should appear seamless to the user. The SCORM content should appear as any other content rendered within the learning design runtime system (Paul Sharples, 7-11-2006).

7 Glossary

A

Access to the knowledge Resources

Once a User has signed in into the TENCompetence system, he / she has the rights to access the resources to which is allowed.

Action

When a certain event occurs (eg the actor wants to solve a problem), the actor searches for an adequate action to perform.

The selected action plan can be any of three types:

1. A single activity (synonym: task)
2. A unit of learning
3. A competence development programme

The (optional) objectives of an action are defined in terms of proficiency levels of competences or in terms of the level of a specific function/job. When the action is completed one can infer automatically that the competence is mastered. Sometimes a certificate can proof this accomplishment (part of the competence assessment).

Prerequisites can be defined in two ways:

- a. By pointing to one or more other actions that are expected to be completed before this action can be performed.
- b. By pointing to competences that have to be mastered before the action can be done.

This depends on the situation. In formal, designed learning networks the competence links would be the best solution. In informal learning the competence definitions could be absent, so a link to an action is needed.

Actions can have time constraints, eg. a course runs from September until December.

This can be modelled with the optional attributes start-time and end-time.

Actions can be blogs (or automatically logged in case of CDP tracks) of the activities, units of learning or CDPs that an actor has performed. In that case the action should be tagged as 'blogged' with the appropriate attribute.

Activity

Activities are descriptions of an action that an actor has to perform (or has performed) to meet some objectives, given some prerequisites. Activities (synonym: tasks) contain an activity description to tell an actor what actions to perform. It also points to the resources and services that are needed to perform the activity.

There are different types of activities:

- a. Learning Activities
- b. Support Activities (tutoring, support students, etc.)
- c. Assessment activities

Activities can be completed in different ways:

- a. For assessment activities: when the test is done. (e.g. all test items are answered and a score is calculated).
- b. For single learning & support activities: when the actor indicates that he has completed the activity/
- c. For activities embedded in a Unit of Learning more complex, property/test based completion criteria can be set.
- d. Learning activities that are blogs of the activities that an actor has performed are always completed (per definition).

Actor

An actor is a person, a team of persons or a formal or informal organization. In our first implementations we focus on individuals as actors.

An actor can have various roles in the learning network that can change according to the policies, but in principle each actor can have the right to perform any task in the system. This means that a person can have the role of learner and of teacher or assessor.

The major roles for an actor are:

- learner
- support provider (eg teacher, tutor, mentor, peer tutor, etc.)
- assessor
- author

Learners have goals (eg. want to improve a competence). After selection of a specific action, they perform the action. When there is no adequate action available they can make the goal 'pending'. Other actors (in the role of author) can provide an adequate action.

Support providers will answer questions that learners have posted for other actors to answer.

An assessor can be involved in the competence assessment, an assessment activity or the unit of assessment.

Authors edit the learning network, the actions within the network, the competence map, the topics and the knowledge resources.

Administrator

The administrator is allowed and entitled to perform some activities addressed to the correct functioning of the TENCompetence system itself, and other ones related to the Permission rights over resources and Users' Access rights. The administrator is also appointed to handling the 'visibility' and listing of the repositories into the system.

Assessment Activity

This type of activity represents classical tests (formative and summarise).

Examples are:

- Multiple choice tests to test whether you master certain principles
- drill and practice tests to train certain skills
- Intake questionnaires to assess personal preferences for personalization purposes.

In this case the assessment activity can contain one or more test items, including the mechanism to score the test (only straightforward scores like percentage good answers; more complicated schema's can be applied in the unit of assessment).

The assessment activities can export to and from IMS QTI.

Note: other kind of stimuli or tasks that are used in the context of a unit of assessment, e.g. the task to deal with incoming mail in an assessment centre can be modelled as learning activities and included in a unit of assessment.

C

Competence

A competence is defined as the ability (‘disposition’) of an actor to act effectively and efficiently upon the events in an ecological niche (an occupation, a hobby, a market, a sport, etc.). In short: the ability to perform effectively in a situation.

Competence is an underlying characteristic (a latent variable or a trait) that cannot be measured directly: competence is estimated from the results of the actions (performance).

The basic challenge in competence modelling is to keep it as simple as possible: it is possible to have very advanced and detailed views on competences. We will try to start with the simplest model as possible (to stimulate ease of use for end-users) and depending on validation exercises we will refine the model when there is an absolute and direct need.

A competence is structured very simple as:

- a. a name
- b. a worldwide unique ID
- c. a competence description (free text)
- d. a creator (the actor who has specified the competence)
- e. a competence-type. This is a free text attribute to define the type of competence. Examples are:
 - cognitive competence, transversal competence, functional competence, etc.
 - Another example: Knowledge, Skill, Ability, Tasks, etc.

These attributes can be used to present the competences to the user in a structured way. A competence must have at least one or more proficiency levels.

The description attribute describes the competence in general, independent of the proficiency levels (e.g. the ‘psychological intervention competence’).

The ‘owner’ attribute can be used to specify in which job context the function/job level requirements are defined. E.g. the job ‘UHD 1/Associate Professor’ at Dutch universities is defined by the VSNU: the association for universities in the Netherlands.

Competence Development Programmes

A Competence Development Programme (CDP; synonyms: route, learning path, curriculum, programme) is an ordered set of activities and units of learning that have to be (or are) followed to attain a certain proficiency level or the requirements for a certain function/job. E.g. the courses and sequence of the courses to be followed in order to get a masters programme in psychology.

Routes can be designed (e.g. a masters programme at a university) or shared tracks (a person with a successful track shares this with other persons. These shared tracks are mostly single linear pathways).

Routes can have zero or more proficiency levels of competences as its objective OR can have zero or more function/job levels as its objective. Designed routes have probably a function/job level as its objective (e.g. a route to become a master in psychology).

Routes can be defined on a time schedule.

Competence Map

A competence map contains a structured way to represent competences, competence levels and the functions/jobs. A competence map has an owner (eg the OUNL, University of Amsterdam, UPF, Bolton or a consortium, a standards organisation). Theoretically a learning network can have zero or more competence maps and competence maps can be nested to model a competence map for each sub domains in the domain. The same actions in the network can be connected to competences in multiple maps. E.g. in a network there is a map from the OUNL (=specified using the creator attribute), but at the same time, there is a map of Sofia University.

The mapping can be different, but the underlying actions can be shared.

To simplify the first implementations (and also the user experience) we have restricted this functionality in the sense that only one competence map may be present in a learning network. When multiple maps are needed we can model this for the time being using the function/role in domain concept. Eg in the digital cinema pilot UPF can have the role 'UPF operator' and Univ. of Sofia the role of 'UniSofia operator' each with different competences defined.

Because of technical reasons (mainly authorisation) a competence map is part of exactly one learning network. This means that a change in a map that is shared among different LNs should be made to every instance of the map in every LN. Changes to a shared map cannot be propagated to all the other using Networks (because then the owner should be authorised in all the other networks). The import/export mechanism is of help to support this process.

Competency

Any form of skill that can be described in a context of learning, education or training.

Content Creator

A content creator can benefit of the TENCompetence system for looking for 'raw' resources to be modified / used in order to produce new resources – e.g. for a new LO.

Course Designer

A course designer may be interested in using the TENCompetence system in order to look for suitable content, i.e. resources, for properly planning an e-learning course.

E

ePortfolio

The portfolio is not a separate entity in the system, but a view on the data in the system for different purposes, eg:

- to reflect on ones accomplishments
 - to make a profile that can be published to the LN
 - to make a profile (a CV) that can be published to a specific group (eg an employer).
- These views can be printed and exported (to be used in another ePortfolio system) in a standard format like IMS ePortfolio (however this seems not a very adequate spec).

The data that are typically of interest in an ePortfolio view are:

- stopped not completed actions
- completed actions
- results of completed actions
- results of the competence assessments of completed actions (evidence for having attained a competence in the learning network)
- data stamps for all data (order of completion can be derived from this for track analysis).
- rating scores
- actions on resources and services (within an action).

Furthermore the portfolio also contains identity information and personal profiles. The actor can make selections of this information available for others to view (and so creating multiple identities).

Import of portfolio data will be supported later.

Historical data can also be entered manually in the portfolio view (e.g. previous acquired competence levels and products and diplomas/certificates (as a proof for the proficiency levels).

F

Function/job in domain

A domain of knowledge can contain different actors with different functions (in work called job functions/job titles). Functions/jobs are constructs to use in competence maps to provide for a natural way to specify different types of competence maps, especially when a domain contains different job functions at different levels.

A functions/job in the domain can be the focus of learning. E.g. in the domain medical profession there are functions/job titles like doctors, nurses, etc.

A functions/job has a set of competences defined that define the minimum requirements for that function.

The competences that are specified under each function specify the target-proficiency levels of that competence that must be met in order to obtain the function (at the specific level of the function).

In a Competence Map at least one function/job should be defined.

Function/job level

Function/jobs can be performed at one or more function/job levels, like Trainer, Master, and Trainee.

In science there are undergraduate students, PhD students, postdocs and professors.

G

Goal

An actor can have several goals to use the system. These goals can be specified in the system so that the system can help the user to fulfil his specific requirements (eg by a wizard).

An actor specifies his/her goal in the system. This goal is of any of the following types:

- a. Search a resource/activity/UOL (‘want to know something’)
- b. Search for a route (study a new function/job level)
- c. Keep up-to-date within an existing function/job level
- d. Improve a proficiency level of a competence
- e. Browse the learning network (meta goal to define a goal)
- f. Want to reflect on my competences (meta goal to define a goal)
- g. Want some support

H

HR Manager

A human resources manager can be interested in looking for resources devoted to assess applicants for a job placement. In other words, the TENCompetence system can be the tool where to find resources for competences assessment – e.g. UoA, that is Units of Assessment.

I

Instructional Designer

An instructional designer is the best person entitled for using the TENCompetence system for own purposes. Through the TENCompetence system s/he can look for all the resources may need for building LO, lessons etc. Moreover, an instructional designer may collaborate with content creators for the production of the suitable content.

K

Knowledge Resources

According to the TENCompetence Domain Model, a Knowledge Resource⁷ can be defined as follows:

“Knowledge resources are any kind of resources that can be used in learning. Typical resources are:

- a. HTML pages
- b. Podcasts / Vodcasts
- c. digital documents
- d. computer programmes
- e. ...

A knowledge resources have a URL as identifier.

Knowledge resources can be searched at the level of the learning network or by browsing the topics.

Knowledge resources can be grouped using specifications like SCORM.”

KRSM system

A Knowledge Resource Sharing and Management system is a SW system whose aim is to process the Knowledge Resources in order to support the user in fulfilling own goals, such as use, create, share, exchange... Knowledge Resources.

L

Learner

The learner role could be performed by any person who uses TENCompetence infrastructure to follow a pedagogical path. His/Her main motivations could be:

- Improve proficiency level
- Keep up to date
- Study for new function or job
- Want for support
- Want to know something

Learning

Learning is defined in TENCompetence as the change of the cognitive state and/or behaviour of the actor in terms of: knowledge, skills, values, needs, motivation or preferences (see the domain model).

⁷ For our purposes Knowledge Resources can be also defined as resources that can be handled by the KRSM system: from raw resources (e.g. images, texts, audio files, videos, animations) to complex ones such as LOs, UoLs, Learning Activities, courses etc. In the use cases here referred to, the terms and expressions ‘resource’ and ‘knowledge resource’ are synonyms.

For further definitions see;- Google Search for Definitions- Literature on Learning (theory)

Learning activities

Learning activities are tasks for learners that describe what they are advised to do in order to attain certain learning or assessment objectives, given some prerequisites.

Learning design

A unit of learning adds a '**learning design**' to the knowledge resources; they add pedagogical aids like study tasks, tutoring, mentoring, monitoring communication services, feedback, formative and summative assessments.

Learning Network

A learning network is an ensemble of actors, learning resources (actions & knowledge resources) and competence maps which are mutually connected through and supported by information and communication technologies to support lifelong competence development.

A learning network is defined on a domain that represents the profession or the domain of knowledge. This domain is also used as the default value for the Competence Map. The creator of a Learning Network is also the 'owner', i.e. the one who has admin rights on the learning network and can set rights for others (also admin rights).

At a higher level than the learning networks it is expected that there is a discovery service to find, subscribe and rate adequate learning networks.

Likert scale

“A **Likert scale** (pronounced 'lick-ert') is a type of psychometric response scale often used in questionnaires, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after Rensis Likert, who published a report describing its use (Likert, 1932). [...] A typical test item in a Likert scale is a statement. The respondent is asked to indicate his or her degree of agreement with the statement or any kind of subjective or objective evaluation of the statement. Traditionally a five-point scale is used, however many psychometricians advocate using a seven or nine point scale.”

Wikipedia (en.wikipedia.org/wiki/Likert_scale)⁸

⁸ There are several resources online for defining Likert scales. The most interesting are the following:
http://www.google.it/search?hl=en&hs=cIs&lr=&client=firefox-a&rls=org.mozilla_s&defl=en&q=define:Likert+scale&sa=X&oi=glossary_definition&ct=title;
<http://www.socialresearchmethods.net/kb/scallik.htm>;
<http://ourworld.compuserve.com/homepages/jsuebersax/likert.htm>;
<http://www.theusabilitycompany.com/resources/glossary/likert-scale.html>

N

Networks for Lifelong Competence Development

Networks for Lifelong Competence Development are defined as collections of programmes. Networks can be defined within a single country or institute (e.g. all the programmes offered by a university or training company) or across countries and institutes. Networks are however defined in one (larger) domain of knowledge like economy, digital media, management, music, etc.

P

Proficiency level

A competence has 1 or more proficiency levels that are an integral part of the competence itself.

The proficiency level can be any range of Integer numbers and indicates the minimum level that needs to be attained for the attainment of a certain function/job in the domain (eg. being a proficient postdoc researcher in psychology).

Zero means that the competence is absent. Depending on the community one can decide to make dichotomies (0 is absent, 1 is present), or a number of discrete levels (eg in a psychology curriculum 12 levels of proficiency are distinguished for the diagnosis competence: 0-11).

R

Resource

As resource is meant a Knowledge Resource. Any kind of resources can be handled by the TENCompetence system: from raw resources (e.g. images, texts, audio files, videos, animations) to complex ones such as LO, UOLs, Learning Activities, courses etc.

Resource Editor

As resource editor is meant also any editing tool and / or authoring tool able to edit / modify / aggregate raw and complex resources. The result of the editing / authoring activity is another raw or complex resource.

<i>S</i>

Scenario

A specific sequence of actions that illustrates behaviour.

Schedule

Actions can be scheduled by an actor.

The design of the schedule is rather complex and has to be elaborated separately. At this moment it is represented in the domain model as a single class to indicate that the schedule is available.

<i>T</i>

Teacher

A teacher may use the TENCompetence system for looking for resources for planning a course or improving an existing one. Of course, a teacher may be helped by a Course designer, an Instructional designer, a Content creator, too.

Tutor

As a teacher, the Tutor may need the use of the TENCompetence system for looking for additional or specific resources that, for instance, can help / complement some topics in an e-learning course.

<i>U</i>

Units of learning

A unit of learning is a plan for a learning and/or teaching process that could be performed to attain certain learning objectives, given certain prerequisites. They are modelled in IMS Learning Design (XML file that conforms to the spec; authored with IMS LD tools). This will be included when WP6 work is finished.

Examples of units of learning are: course plans, lesson plans, workshop plans, etc. A unit of learning contains (references to):

- learning objectives and prerequisites
- learning activities - support activities
- a description of the roles that perform activities in the unit of learning
- a description of the learning objects and services that are needed during the execution of the activities
- a description of the information that should be stored during the unit of learning, including portfolio information

- a description of the teaching-learning process (learning design): which role performs which activities in which sequence?
- a description of personalisation/adaptation aspects (certain persons get different resources/activities depending on their profile) Units of Learning are formally modelled and interchanged using the IMS Learning Design specification.

Units of learning can contain time information that is related to the schedule.

Use case

A description of a set of sequences of actions, including variants, that a system performs that yields an observable result of value to an actor.

Appendix A: WP5 Scenarios

Glossary:

Acronym	Definition
KRSM	Knowledge Resources Management & Sharing
UI	User Interface

Assumptions:

Assumption ID	Assumption
A_01	<p>As Resource is meant a Knowledge Resource. Any kind of resources can be handled by the KRSM system: from raw resources (e.g. images, texts, audio files, videos, animations) to complex ones such as LOs, UoLs, Learning Activities, courses etc.</p> <p>In the scenarios and in the use cases here referred to, the terms and expressions ‘resource’ and ‘knowledge resource’ are synonyms.</p>
A_02	<p>As Resource Editor is meant also any editing tool and / or authoring tool able to edit / modify / aggregate raw and complex resources. The result of the editing / authoring activity is another raw or complex resource.</p> <p>In the scenarios and in the use cases here referred to, the terms and expressions ‘editor’, ‘resource editor’, ‘editing tool’, ‘authoring tool’ are synonyms.</p> <p>In particular, CMS and LCMS are considered authoring tools.</p>
A_03	<p>Once a User has signed in into the TENCompetence system, he / she has the rights to access the resources to which is allowed via the KRSM system.</p>
A_04	<p>Each Knowledge Resource can have specific metadata description assigned to it, according to some specific metadata standard. For each type of Knowledge Resource we can have one or more possible metadata standards used for metadata tagging of this resource. If some Knowledge Resource does not have a specific metadata description assigned, the KRSM will use for this resource some metadata by default (resource name, size, date of creation, date of the last change, date of the last access, author).</p>
A_05	<p>Each Repository is described by a flag which shows whether the Repository</p> <ul style="list-style-type: none"> • can contain the whole Resource without needing to perform further operations • can contain the whole Resource if some space on the Repository is freed • can contain the whole Resource if the Repository’s MAX_STORAGE_THRESHOLD is increased • cannot contain the whole Resource even if some space on the Repository is freed and/or its MAX_STORAGE_THRESHOLD is increased (this group of repositories could not be shown at all)
A_06	<p>The User should not be allowed to select repositories belonging to the fourth group (in case this group is shown in the list)</p>

Title of Scenario	Creating knowledge resources
Scenario ID	KRSM_S_01
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06; 30/05/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to create a resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface ⁹ (UI). In order to perform this task the User can select the proper resource editor aimed at producing the needed resource and / or select the resource kind and / or format. In the latter case, a suitable list of tools (i.e. the resource editors) by which the resource can be produced is offered to the User. The list of resource editors should be mapped on the locally-available tools on the User's computer. It is advisable to have a 'default' or a '(most) recommended' tool, in order to help the User to decide according to the resource kind / format. If there are not tools available to perform the creation task for the needed resources (e.g. the User selects the resource desired format and the KRSM returns no results available, that is, no tools available that can be associated to the selected resource format), the KRSM should be able to suggest an alternative resource format (e.g. no .mov editors available, but .avi ones) and / or to download and install a proper tool. Therefore, an updated list of resources editing tools and one for the resources formats should be available and accessible via KRSM. The lists should be ordered according to a reasonable criterion (e.g. the frequency of use: if the User has created 10 texts and 1 image, it is reasonable that in the list the resource kind "text" precedes the resource kind "image". Less used resource kinds could even be hidden and shown only after an explicit User request. The same applies for the tools.) Then the editor is loaded and the resource is created¹⁰. The new resource is loaded into the KRSM system and the 'most recently used' resources list is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>(Learner,) Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<i>[Outline the involved TENCompetence work packages]</i>

⁹ OIC_S_001

¹⁰ OIC_S_002

	<i>and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i> WP5 + WP3-WP9
Related Use Cases	<i>[If applicable, list the related and mentioned use cases]</i> KRSM_UC_001

Title of Scenario	Storing knowledge resources
Scenario ID	KRSM_S_02
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to store a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the User loads the resource into the KRSM system and stores it in a proper repository. The resource can be loaded from a local file system (e.g. the User's one) or from a remote repository. The resource can be stored into a local file system (e.g. the User's one) or into a remote repository. The KRSM should be able to make available all (networks of) repositories to which the User is allowed to access. Therefore, the User should be able to select a repository (or more, in case of multiple storage – resource replication on different repositories could be useful for speeding up resource retrieval and / or creation) from a list and / or a map of (networks of) repositories. The KRSM should be able to monitor the system's Storage capacity (cf. KRSM_S_14).</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_002 KRSM_UC_006 KRSM_UC_007 KRSM_UC_011</p>

Title of Scenario	Searching knowledge resources
Scenario ID	KRSM_S_03
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06, 01/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the User is offered different options:</p> <ol style="list-style-type: none"> 1. the User can browse the ‘most recently used’ resources list to see whether the resource is already loaded (e.g. ‘cached’) into the KRSM system or not, 2. the User can browse the resources available in the network of repositories onto which is allowed to access¹¹, 3. the User can entry the name or part of it (e.g. by using wildcard characters) of the to-be-sought resource into a search field, 4. the User can look for a resource by browsing all the ones matching with a specific format pattern, 5. the User can look for a resource by browsing all the ones matching with a content pattern. In this case the KRSM should be able to provide the User with a proper editing tool¹² in order to feed the system with the content pattern to search, 6. the User can look for a resource by setting some search parameters related to resource sharing, quality rating, activity history (e.g. update, deletion, and version)... . <p>According to option 2, the User can ‘see’ directly where the resource is stored. On the contrary, options 3 to 6 foresee a feedback from the KRSM system in terms of list of results and / or resource preview (whenever possible, e.g. the User doesn’t have a proper tool to view the resource, therefore, the KRSM client cannot load it into the UI). Moreover, options 3 to 6 can be used also for refining the search performed in option 2. Therefore, the User should be able to limit the number of results fetched by the search and the number of the ones to be displayed at once. In both cases (i.e. maximum number of returned results to be displayed and / or to be sought) the system should be able to set and propose a ‘default’ value.</p>

¹¹ OIC_S_004

Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_003 KRSM_UC_004 KRSM_UC_007</p>

¹² OIC_S_003

Title of Scenario	Retrieving knowledge resources
Scenario ID	KRSM_S_04
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the User needs to search the resource first. Once the resource has been found, the User selects it and loads it into the KRSM (i.e. the resource is ‘cached’ into the KRSM and made ready available).</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_004 KRSM_UC_003 KRSM_UC_006 KRSM_UC_007</p>

Title of Scenario	Packaging knowledge resources
Scenario ID	KRSM_S_05
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to build packages of resources (e.g. a LO from raw knowledge resources, a course packages from LOs, Units of Learning, Learning Activities, Learning paths).</p> <p>The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI).</p> <p>In order to perform this task the User needs to retrieve the resources first.</p> <p>Once the resources have been loaded into the KRSM, the User triggers the KRSM system's utility devoted to build the packages from the resources. Therefore a list of available authoring tools / editors is presented to the User. If more than one is available the KRSM system set a 'default' / recommended one.</p> <p>The User opens the proper tool and packages the resources.</p> <p>The new package is considered as a new resource by the KRSM system and the 'most recently used' resources list is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>(Learner,) Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_005 KRSM_UC_003 KRSM_UC_004 KRSM_UC_006 KRSM_UC_007</p>

Title of Scenario	Using knowledge resources
Scenario ID	KRSM_S_06
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06, 01/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to use a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the User needs to retrieve and load the resource. This means that the resource is ‘cached’ by the KRSM and ready to be used. The User uses the resource whenever it is required for other tasks (e.g. creation of resources from other ones – LOs and ‘packages’ included). Therefore, the User has to interact with the KRSM in order to trigger the proper tool (embedded or external to the KRSM system) for using the resource. The ‘most recently used’ resources list is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_001 KRSM_UC_003 KRSM_UC_004 KRSM_UC_006 KRSM_UC_007</p>

Title of Scenario	Sharing knowledge resources
Scenario ID	KRSM_S_07
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06, 01/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to share a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the resource has to be in use. Then the User sets the access parameters to the resource. Basically:</p> <ul style="list-style-type: none"> • the User can set the kind of user is allowed to access the resource by selecting it from a list, • the User can enter the name of a specific user (who is meant to be registered in the TENCompetence system), • the User can set the kind of access to the resource that can be assigned to a specific user or group of users. <p>The information related to the modified rights of the access to the resource is stored into the KRSM system.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>(Learner,) Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_007 KRSM_UC_003 KRSM_UC_004 KRSM_UC_006</p>

Title of Scenario	Rating the Quality of knowledge resources
Scenario ID	KRSM_S_08
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06, 01/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to rate the quality of a knowledge resource.</p> <p>The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI).</p> <p>In order to perform this task the resource has to be in use.</p> <p>Then the User sets quality rate of the resource by:</p> <ul style="list-style-type: none"> entering a value in a proper field (where range values are provided by the KRSM UI), selecting it from a list (e.g. a value in a Likert scale). <p>The information related to the (modified) quality rate of the resource is stored into the KRSM system.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_008 KRSM_UC_001 KRSM_UC_003</p>

Title of Scenario	Updating knowledge resources
Scenario ID	KRSM_S_09
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to update a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the resource has to be in use. The ‘most recently used’ resources list is updated. If the resource is modified, the new version is tracked and the previous one is tagged as first back-up version of the resource. Moreover, the list of the resource versions is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_001 KRSM_UC_003 KRSM_UC_010 KRSM_UC_018</p>

Title of Scenario	Deleting knowledge resources
Scenario ID	KRSM_S_10
Author	Giunti Interactive Labs S.r.l.
Date	20/03/06, 01/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to delete a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). Then the User flags the resource as ‘Deleted’ (i.e. the resource is no more available to the Users, but it is not actually deleted). And the resource is no more available to the users. The ‘most recently used’ resources list is updated (i.e. the link to the deleted resource is erased).</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_009 KRSM_UC_001 KRSM_UC_003 KRSM_UC_010</p>

Title of Scenario	Resources previewing
Scenario ID	KRSM_S_11
Author	Giunti Interactive Labs S.r.l.
Date	24/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to preview a Knowledge Resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to perform this task the User has retrieved the resource as described in the scenario KRSM_S_04 and at least one resource player is available. Afterwards, opening the resource Properties the User can preview the resource by setting on a suitable flag.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_011 KRSM_UC_001 - KRSM_UC_009</p>

Title of Scenario	Logging to the KRSM system
Scenario ID	KRSM_S_12
Author	Giunti Interactive Labs S.r.l.
Date	24/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to perform any Administration activity that requires previous authentication and authorisation from the KRSM system.</p> <p>The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI).</p> <p>In order to perform this task the Administration area is provided with entry field box where the User can enter her / his Login Name and Password in order to sign in. Moreover, the User must have the authorisation (i.e. the access rights) for performing such activities.</p> <p>The User has accessed the KRSM system.</p> <p>The access log to the KRSM system has been updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator (in particular, the latter)</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_012 KRSM_UC_013 KRSM_UC_014 KRSM_UC_015</p>

Title of Scenario	Addition of a new repository
Scenario ID	KRSM_S_13
Author	Giunti Interactive Labs S.r.l.
Date	24/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to add a new repository. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). In order to allow the User to perform this task the KRSM system requires to identify the User. Therefore, the User is required to sign in (again) as described in the scenario KRSM_S_12 on logging on the KRSM system. Afterwards, the User is allowed to perform this task provided that the KRSM system recognises her / him as authorised user. The new repository has been added.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator (in particular, the latter).</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_013 KRSM_UC_012 KRSM_UC_014 KRSM_UC_015</p>

Title of Scenario	Storage capacity
Scenario ID	KRSM_S_14
Author	Giunti Interactive Labs S.r.l.
Date	05/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to store a knowledge resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). The User performs the actions described in the scenario KRSM_S_02 on storing the knowledge resources. Just in case the knowledge resource to be stored exceeds a certain size (i.e. it is bulky enough so that it cannot be stored on the selected repository – a variable threshold should be fixed by the KRSM in order to guarantee the correct functioning of the system and its maintenance, for instance, by preserving enough room for back-up operations), the KRSM should warn the User about the problem and propose either to store the resource in (an)other repository(-ies) s/he is allowed to access (e.g. by splitting it in smaller chunks) or to manually extend the limit of the storage capacity on the repository(-ies), that is, in other words, to shorten the no-storage area on the repository(-ies) up to a pre-fixed system ‘safety’ limit beyond which the normal operating system’s activities are at risks (e.g. file swapping area). The KRSM should also invite to free some space on the repository(-ies). Therefore, a two level threshold should be taken into account:</p> <ul style="list-style-type: none"> • a ‘loose’ one, set by the KRSM, that can be handled by the User (also by directly accessing the KRSM’ Settings); • a strict and fixed one, set by the operating system, that cannot be overstepped for system’s safety reasons; and the User can set the first one up to the limit of the latter. <p>In the worst case, the resource cannot be stored because there’s no room available. The ‘most recently used’ resources list is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>

Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_014 KRSM_UC_015 KRSM_UC_002</p>

Title of Scenario	Back-up
Scenario ID	KRSM_S_15
Author	Giunti Interactive Labs S.r.l.
Date	05/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to perform the system's back-up. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). The User performs the Back-up action in the KRSM Tools area. If there is not enough room to perform this activity, the User can set the Storage capacity by properly modifying the KRSM settings (cf. KRSM_S_014).</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_015 KRSM_UC_014 KRSM_UC_002</p>

Title of Scenario	Mobility
Scenario ID	KRSM_S_16
Author	Giunti Interactive Labs S.r.l.
Date	05/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to perform activities on the KRSM system (i.e. the operations that s/he has to perform requires directly or indirectly invoking of the KRSM system) and is likely outdoor or in any situation where the standard (i.e. likely at office/home with Internet cable connection and a desktop computer) utilisation of knowledge resources is prevented.</p> <p>The KRSM provides a feedback (i.e. proper reaction to User's request) by taking into account the User's location (e.g. outdoor/indoor), facilities (e.g. Internet cable/wireless connection, dial-up/DSL), devices (e.g. notebook, hand held devices such as smart-phones, PDAs, palmtops). For instance, the KRSM should be able to deliver the content in a suitable format (e.g. light-weight .gif or even thumb-nails instead of heavy .bmp) in order to speed up the download times.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>All but KRSM_UC_013 and KRSM_UC_015</p>

Title of Scenario	Previewing knowledge resources metadata
Scenario ID	KRSM_S_17
Author	Giunti Interactive Labs S.r.l.
Date	24/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to preview the metadata associated to a (knowledge) resource. The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI). Once the (knowledge) resource is selected or in use the User can quickly view the metadata associated by accessing the resource properties in the KRSM UI.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>Learner, Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_017, KRSM_UC_018.</p>

Title of Scenario	Addition / change / deletion of metadata to knowledge resources
Scenario ID	KRSM_S_18
Author	Giunti Interactive Labs S.r.l.
Date	24/06/06
Description (narrative)	<p><i>[Describe the context and the scenario]</i></p> <p>The User needs to add change / deletion of new metadata to a (knowledge) resource.</p> <p>The User opens the TENCompetence Knowledge Resources Management & Sharing (KRSM) User Interface (UI).</p> <p>In order to perform this task the resource has to be in use and the proper editing / authoring tool running.</p> <p>The User performs the metadata addition / change / deletion by the means of the running editing / authoring tool. Therefore the KRSM tracks only the changes performed. The ‘most recently used’ resources list is updated.</p> <p>If the resource is modified, the new version is tracked and the previous one is tagged as first back-up version of the resource.</p> <p>Moreover, the list of the resource versions is updated.</p>
Actors, Stakeholders	<p><i>[Outline the Stakeholders involved]</i></p> <p>(Learner¹³), Instructional designer, course designer, teacher, content creator (e.g. graphic artist, editor), learning content creator, tutor, HR manager, vocational trainer, KRSM administrator.</p>
Relevant WP	<p><i>[Outline the involved TENCompetence work packages and/or the levels from knowledge resources, learning activities, competence development programmes, and learning networks]</i></p> <p>WP5 + WP3-WP9</p>
Related Use Cases	<p><i>[If applicable, list the related and mentioned use cases]</i></p> <p>KRSM_UC_018, KRSM_UC_017, KRSM_UC_009.</p>

¹³ OIC_S_005

Appendix B: WP6 Scenarios

Title of Scenario	Populate a Pedagogical Scenario with my own Resources
Scenario ID	<i>7.1.1.1 WP6S-06</i>
Author	Phillip Beauvoir
Date	April 19 th , 2006
Description	<p>This scenario revolves around designed e-learning in which authoring tools are used for creating Units of Learning.</p> <p>A designer will have created one or more Units of Learning using authoring tools based upon the IMS Learning Design specification. The structure of Roles, Activities, Environments, Roles Parts, and Acts can at this stage be defined in the abstract without references to actual Resources, or at least to only some Resources, the others to be added later. This allows for re-use of the UoL in more than one case.</p> <p>To deploy the Scenario as an actual instance, it needs to be populated with the author's own concrete Resources.</p> <p>An example – a designer wishes to deploy a Scenario with actual Resources they have collected themselves. The designer needs to gather the Resources in one place, reference them in the UoL and package them together for the final IMS LD package.</p>
Actors, Stakeholders	<ul style="list-style-type: none"> • Staff • E-learning Designers, who model learning processes in authoring tools.
Relevant WP	WP6
Related Use cases	

Title of Scenario	Populate a Pedagogical Scenario with Resources available on the Web
Scenario ID	WP6S-07
Author	Phillip Beauvoir
Date	April 19 th , 2006
Description	<p>This scenario revolves around designed e-learning in which authoring tools are used for creating Units of Learning.</p> <p>A designer will have created one or more Units of Learning using authoring tools based upon the IMS Learning Design specification. The structure of Roles, Activities, Environments, Roles Parts, and Acts can at this stage be defined in the abstract without references to actual Resources, or at least to only some Resources, the others to be added later. This allows for re-use of the UoL in more than one case.</p> <p>To deploy the Scenario as an actual instance, it needs to be populated with Resources that are available on the Web. Issues of availability, ownership and copyright need to be resolved.</p> <p>An example – a designer wishes to deploy a Scenario with Web Resources they have collected bookmarks for. The designer needs to reference them in the UoL and package them together for the final IMS LD package.</p>
Actors, Stakeholders	<ul style="list-style-type: none"> • Staff • E-learning Designers, who model learning processes in authoring tools.
Relevant WP	WP6
Related Use cases	

Title of Scenario	Populate a Pedagogical Scenario with Resources available in the TENCompetence infrastructure
Scenario ID	7.1.1.2 WP6S-08
Author	Phillip Beauvoir
Date	April 19 th , 2006
Description	<p>This scenario revolves around designed e-learning in which authoring tools are used for creating Units of Learning.</p> <p>A designer will have created one or more Units of Learning using authoring tools based upon the IMS Learning Design specification. The structure of Roles, Activities, Environments, Roles Parts, and Acts can at this stage be defined in the abstract without references to actual Resources, or at least to only some Resources, the others to be added later. This allows for re-use of the UoL in more than one case.</p> <p>To deploy the Scenario as an actual instance, it needs to be populated with Resources that are available in the TENCompetence infrastructure. Issues of availability, discovery, ownership and copyright need to be resolved.</p> <p>An example – a designer wishes to deploy a Scenario with Resources that are available in the TENCompetence infrastructure. The designer needs to be able to discover these Resources and reference them in the UoL and package them together for the final IMS LD package.</p>
Actors, Stakeholders	<ul style="list-style-type: none"> • Staff • E-learning Designers, who model learning processes in authoring tools.
Relevant WP	WP6
Related Use cases	

Title of Scenario	Assess an existing Unit of Learning
Scenario ID	WP6S – 09
Author	Juri Luca De Coi, UHANN
Date	April 21 st , 2006
Description	<p><i>This scenario revolves around</i> assessing whether an existing UoL suits the learner's needs <i>In the abstract, the scenario deals with</i> run-time selection of the best suiting UoL among a number of available ones <i>Therefore the TENCompetence infrastructure must provide</i> tools able to avoid the learner from manually browsing each UoL in order to find the best suiting one</p> <p><i>Main issues</i> The problem of choosing the best suiting UoL among a number of available ones does not differ from the problem of searching UoLs stored in one or more repository/ries. Therefore the techniques which are needed are the same: since keyword-based search is not powerful enough, each UoL should be described by metadata. Moreover searching based on values of metadata records should be allowed. In order to identify the best suiting UoL among a number of them, such metadata records should contain information as</p> <ul style="list-style-type: none"> • topic or even an outline of the UoL (in order to allow searching based on content) • the intended user (his/her age, cultural background ...) • features of the UoL (in order to match the learner's preferences) <p><i>Example</i> At present Wikipedia reports 49 different meanings of the word „Mercury“. It is highly likely that a simple keyword-based search would lead to gather a lot of UoLs, the learner is not interested in. Even specifying the topic could not be enough (Wikipedia lists 21 different meanings in the category „Culture“) but it could be needed to provide the learner with a short outline. After having realised that the UoL deals with the right subject, the learner may want to further refine his/her search in order to find UoLs specifically targeted for arachnophobic people. Finally, (s)he may want to select a UoL whose background looks either green or blue. Having filtered in this way the available UoLs, their number will hopefully have decreased sufficiently to allow the learner to directly have a look at the remaining ones and definitely select the best suiting one.</p>
Actors, Stakeholders	Learner
Relevant WP	WP5 WP6
Related Use cases	WP6S – 05

Title of Scenario	Create my own Assessment Plan
Scenario ID	WP6S – 10
Author	Adelina Aleksieva-Petrova, Sofia University “St. Kliment Ohridski”
Date	April 20 th , 2006
Description	<p>Creation of Assessment Plan can be described as a part of 10 Competence Assessment Model – in phase 1 named Assessment design. The scenario has following steps:</p> <ul style="list-style-type: none"> • The Learner/e-learning designer (called user for short) addresses (select) Population which has default Trait. The Trait can be either Complex Trait or Elementary Trait. According defined trait refers one or more decision rules. • User describes Assessment function as general objective or aim of the assessment plan (like diagnose, position or certificate). • Define assessment scenario as set of rules, weight and schedules (assessment sessions). • Assign assessment policy to Assessment Plan <p>These steps assemble Assessment Plan and prescribe Assessment Type of unit of assessment.</p>
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • E-learning Designers
Relevant WP	WP6
Related Use cases	Define Trait Use case, define population use case, define decision rule use case, define assessment function use case, define assessment policy use case, define assessment session use case, define assessment scenario use case.

Title of Scenario	Search, Find and Use “as is” an existing Assessment Plan
Scenario ID	WP6S – 11
Author	Adelina Aleksieva-Petrova, Sofia University “St. Kliment Ohridski”
Date	April 20 th , 2006
Description	User can search existing assessment plans using some criteria (like population, trait, assessment scenario and decision rule). He/she selects one Assessment plan from result set and can view details before use it. User can use “as is” selected assessment plan in phase assessment construction in order to build Unit of Assessment.
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • E-learning Designers
Relevant WP	WP6
Related Use cases	Search and Find an existing Assessment Plan, Use an existing Assessment Plan

Title of Scenario	Search, Find and Modify an existing Assessment Plan (restricted authoring features)
Scenario ID	WP6S – 12
Author	Adelina Aleksieva-Petrova, Sofia University “St. Kliment Ohridski”
Date	April 20 th , 2006
Description	User can search existing assessment plans using some criteria (like population, trait, assessment scenario and decision rule). He/she selects one Assessment plan from result set and can view details and modified non-restricted features before use it.
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • E-learning Designers
Relevant WP	WP6
Related Use cases	Search and Find an existing Assessment Plan, Update an existing Assessment Plan

Title of Scenario	Search, Find and Update an existing Assessment Plan (extended authoring features)
Scenario ID	WP6S – 13
Author	Adelina Aleksieva-Petrova, Sofia University “St. Kliment Ohridski”
Date	April 20 th , 2006
Description	User can search existing assessment plans using some criteria (like population, trait, assessment scenario and decision rule). He/she selects one Assessment plan from result set and can view details, modified it and save as new assessment plan.
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • E-learning Designers
Relevant WP	WP6
Related Use cases	Search and Find an existing Assessment Plan, Update an existing Assessment Plan

Title of Scenario	Collaborating at Run-time (MSN Messenger, Chat/Forums, Breeze, ...)
Scenario ID	WP6S-14
Author	Colin Tattersall, The Open University of The Netherlands
Date	April 18 th , 2006
Description	<ul style="list-style-type: none"> • This scenario revolves around designed e-learning in which run-time collaboration tools are used. • In the abstract, the scenario deals with <ul style="list-style-type: none"> ○ Design-time interweaving of a collaborative service in a learning process, so that the TENCompetence infrastructure must support design activities ○ Run-time instantiation and provisioning of the services by the TENCompetence infrastructure. • An example situation would be an auxiliary course for professional translators wishing to improve their skills in a particular domain (eg legal texts, texts in the computer industry, etc). <ul style="list-style-type: none"> ○ The course starts with an introduction to the domain containing some general terms, and then gives the learner the possibility to select a specific sub-domain in which to specialise, requiring the translation of some texts. Finally, short phone conferences are automatically setup at fixed times with specialists in the source and target languages whereby the translator is required to translate on-the-fly. Grades are issued by the specialists immediately following the phone conferences.
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • Staff • E-learning Designers, who model learning processes which make use of run-time collaboration tools.
Relevant WP	WP6
Related Use cases	

Title of Scenario	Retrieve interactions and data from external Services (MSN Messenger, Chat/Forums, Breeze etc)
Scenario ID	WP6S-15
Author	Colin Tattersall, The Open University of The Netherlands
Date	April 18 th , 2006
Description	<ul style="list-style-type: none"> • This scenario revolves around designed e-learning in which run-time tools are used and whereby data exchange is required. • In the abstract, the scenario deals with design-time and run-time interweaving of a service in a learning process, whereby data concerning the learners/staff interaction with the service is used in the further progression of the learning process • An example situation is an e-learning situation whereby students are asked to maintain a blog for the duration of a course. The tutor would like to monitor whether a blog has been set-up by each student and see an indication of how many posts have been made and how many responses generated.
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • Staff • E-learning Designers, who model learning processes which make use of run-time services.
Relevant WP	WP6
Related Use cases	

Title of Scenario	Altering Activities and/or Sequence of Activities at Run-time
Scenario ID	WP6S-16
Author	Colin Tattersall, The Open University of The Netherlands
Date	April 18 th , 2006
Description	<p>In this scenario, a running e-learning process is required to be changed, for example:</p> <ul style="list-style-type: none"> • to correct textual mistakes • to include additional resources, activities, conditions or properties • to modify properties or conditions so that the flow is influenced • to redefine sequences on-the-fly to remove some possibilities <p>An example scenario might be one in which a condition requires that students achieve at least 50% in a test before progressing to the next test. When a cohort of 750 students starts the course, it turns out that the test is more difficult than expected, with 40% being a better threshold. This change needs to be made to the running process.</p>
Actors, Stakeholders	<ul style="list-style-type: none"> • Staff • E-learning Designers
Relevant WP	WP6
Related Use cases	

Title of Scenario	Support of different Resource Types (SCORM v1.2, SCORM2004, QTI v2.1)
Scenario ID	WP6S-18
Author	Colin Tattersall, The Open University of The Netherlands
Date	April 18 th , 2006
Description	An e-learning designer wishes to incorporate a SCORM package into a multi-role learning process. The process begins with resource-based self-study involving web-based texts. This is followed by a 30 minute chat session in which the tutor posts propositions concerning planetary motion which are discussed by the students. This is followed by the students individually viewing a SCORM animation showing planetary motion. Finally a second chat session is organised for the students to reflect on new understandings
Actors, Stakeholders	<ul style="list-style-type: none"> • Learners • Staff, • E-learning Designers
Relevant WP	WP6
Related Use cases	

Appendix C: WP7 Scenarios

Scenario 1: Formal Learning - electronic technician wants to become electrical engineer

Version 1.0

Authors: Arne Koesling, Daniel Olmedilla

Michael finished an apprenticeship as electronic technician. He worked afterwards in a smaller firm producing wind generators in Aurich, Northern Germany. After three years of occupation, he decides to start additionally a study nearby to become electronics engineer. He already knows that the theoretical parts can be done completely by distance learning in the evenings while some practical parts are realized as blended learning and therefore require attendance.

Michael has already a certificate in hard soldering, one TELC-certificate in English for technical purposes of level B2 and an additional one in doing Quality Management by DIN EN ISO 9000:2000.

He downloads and starts a Personal Learning Environment software (PLE) on his desktop. He uses the ePortfolio creation service, enters his personal properties and preferences and includes two of his digitally signed certificates which are on his computer and provides a purpose-built URL for the TELC Certificate which is not available on his desktop but on a special server of the Institution that issued the Certificate. Afterwards he connects to the (non-anonymous) TENCompetence system and submits his wish for a formal competence development programme (CDP) in 'electrical engineering' which provides certification. The PLE, using Michael's goal together with his portfolio and some preferences (e.g. distance courses for theoretical aspects), lists all the available CDPs¹⁴ and notifies Michael not only about CDPs matching exactly his occupation ('electrical engineering') but also other related possibilities like 'information technology', 'measurement and control technology' or 'microsystems technology'.

Since Michael has already some experience in building and planning wind generators, and wants to stay in this field, he decides for 'electrical engineering / energy and building services engineering', and filters the results returned by the PLE accordingly. From the filtered lists, he selects different possibilities and inspects the different topics of the courses in the different available programmes, the duration of the programmes, the quality of the certificate (e.g. bachelor vs. master) and if he could be exempted from some of the courses due to the certifications and experience he already has). In addition, he also checks where the face-to-face courses take place and finally decided for the CDP that is provided nearby at the university of Emden in combination with the University of Hannover which grants some exemptions in the formal competence development programme based on his prior knowledge. Because of his TELC-certificate of advanced level B2, which is still valid for 4 years, the university automatically provides a 4-year valid exemption of the foreign language course (English). Regarding his hard soldering certificate, the university grants an exemption of an otherwise mandatory and face-to-

¹⁴ http://berufenet.arbeitsamt.de/bnet2/D/B6020105ausbildung_a.html (in German)

face soldering course (although this must be reviewed by a university staff member once after Michael has applied to start his study).

The System can't find an exactly match for the Quality Management by DIN EN ISO 9000:2000 certificate and no exemption is provided. However, it offers Michael to submit a request to the staff of the university to check this for a manual review. In fact, he does it and this manual review results on the possibility of directly starting the assessment of this course to test his prior knowledge, due to the relation on contents between the course 'reliability in electronics engineering' and the one Michael took on DIN EN ISO 9000:2000. Finally, his position as apprenticeship as electronic technician is not yet standardized because Michael wants a formal competence development programme, no exemptions are given and he is not allowed to simply by-pass basic courses like e.g. 'process control' in which he has already all the necessary knowledge.

Now that Michael is registered for such a CDP, it will be checked by the Competence Assessment Service and probably updated each time that Michael re-enter the TENCompetence Network.

From the moment that Michael was registered at a particular institution (in this case the university of Emden), and issued the payment, he can directly start to work on courses. The PLE presents him possible steps to continue his studies depending on the effectiveness and efficiency of previous learners, explicit ratings of other learners or his personal preferences.

In addition, while fulfilling some courses, Michael unlocked new courses, and some of these may require physical attendance. Therefore, he updates his online calendar with the fixed appointments he already has (so the PLA can check his free time and suggest dates for the courses) and/or chooses manually the dates when he wants to attend the courses, according to the possibilities given by the university.

However, since the area of study is changing rapidly over time, the validity of some of the courses is limited in time (10 years) and in case the whole CDP is not finished within that time, Michael would have to make them again.

Michael uses the Performance Assessment Service in order to see his improvements and test his new knowledge (and perhaps already gained competences). In addition, while doing his distance learning studies, he typically has many questions arising regarding the learning process or the learning content. When he has to deal with a content-related question, he uses the Learner Support Service to place it in a related help-forum and a few seconds later, the Learner Support Service presents him some entries of the FAQ and some learners (with knowledge in that area) that are suitable and available to help him as peer-tutors. Because Michael can't find a suitable answer in the FAQ, he chooses to contact one or several of the peer-tutors assigned. There may be different possibilities to provide support to Michael. For example, the Learner Support Service may start up a collaborative frontend with chat, wiki and whiteboard and place some pre-processed answers in the wiki for the peer-tutor. The same session is open for other learners as well to join and collaborate. Such a transient community of people is just built up in order to deal with this issue and the final results are recorded and automatically added into the internal help system and the FAQ.

Scenario 2: Informal Learning - Employee wants to improve management knowledge

Version 1.0

Authors: Arne Koesling, Daniel Olmedilla

The employee Franz of a medium-sized firm has a computer science degree from University of Oldenburg, Northern Germany. His certified requirements are already adequate to hold a project manager position (he coursed Software Engineering as part of his studies) but he knows that his knowledge was mostly superficial and he even forgot most of it. His boss has offered him to manage a small internal software-developing project starting next month and he knows this may be his time to shine. Therefore, in order to fill his lack of knowledge on management and accounting he decides to build up the required knowledge.

He only has one month and he does not need any formal training so he decides to query the TENCompetence learning network in order to build the appropriate competence. Franz searches for it in the learning network using his Personal Digital Assistant (PDA). For that, he inputs his goal (in the form of the desired competence/s) and, since he does not want formal CDPs to be returned, he checks “informal learning”. The list of results is long but he sorts it according to estimated duration. In addition, he examines who was the person/institution that uploaded each programme. At some point, he finds a CDP created by a colleague of his company, who is currently in a higher position. Franz believes that such a programme would better fit his needs in the company than any other. Therefore, he selects it and examines the content.

Since he has not yet input any knowledge or experience, the PDA indicates that he has to perform all the learning units. However, observing the learning path recommended by the PDA he realizes that he may skip some courses. Therefore, he includes some knowledge in his portfolio like his computer science degree and his current experience in the company. The PDA suggests exemptions to be made regarding the IT-related parts of Franz's Competence Goal. In addition, it considers that the computer science degree Franz studied is already quite far in the past and Franz may have forgotten some topics, as well as ignore some recent topics which were not available at the time he was studying. Therefore, the PDA marks some courses as optional (indicating the reason and leaving Franz the decision of coursing them or not) and also adapt the content focusing on an overview (to refresh previously acquired knowledge) and on those new issues not available in old curricula.

Franz indicated that he would like to start with courses with shorter duration in order to gain some knowledge on different areas as soon as possible (and be able to give the right impression in future meetings before the project starts). The PDA suggests to start with a course on “leadership” and continue with “budget management”. Franz has already led smaller teams and therefore decides to skip the former and go directly to the latter. For “budget management” there are different alternatives. As Franz dislikes to learn alone (and had indicated it as preference) the PDA recommend a learning activity happening nearby (based also on the location contained in his profile). In addition, the PDA provides a list of learners requesting for a face-to-face learning-partner and provides collaboration tools like chat, whiteboard or wiki to collaborate online with other learners (probably from his existing buddy list).

Thanks to so many facilities and ease for learning, Franz manages to successfully complete all the courses in a period of a month, so he was perfectly prepared for the starting of the project.

Appendix D: WP8 Scenarios

User Scenario 1: Visualize job positions and competences

Sally, an IT with a bank, is fed up with her job and is contemplating a career change. She has always been interested in the area of animation and this could be a possible avenue to pursue. She is savvy with the computer and design software but has no idea what a career in animation would entail. She would like to be able to see what positions are available in animation as well as the competences that she needs in order to apply for these positions. In addition, she would like to position herself within the network, to see where she stands (with her given skills) with regard to different positions and to see which position she can most easily qualify for. Additionally, Sally would like to get in touch with current people in the business, to tap them for ideas and recommendations (e.g. what programmes would they recommend, what position would best fit a novice, what is the general career path in animation, or alternate paths) on what the best route to take for someone in her position.

User Scenario 2: Visualize people networks and their competences/expertise

Rebecca Flores, a car engineer, would like to develop her competence in designing sensor systems. She has an idea to use parking sensor techniques for scanning crossing animals because she felt concerned by the number of people and animals killed on the road overnight, simply because the lighting of a car is quite poor.

She decides to look into TENCompetence for people and concepts close to radar sensoring system and gets a concept map where other ideas such as thermal scanning appear. She instantaneously thinks that this kind of system is mobile enough to have it on board of a car and that it could have an alarm to make sure that the driver is warned about this coming risk. Starting with the idea of thermal scanning she is querying TENCompetence network space for people who are experts in this area and gets a people-concepts map allowing her to explore different opportunities of engagements. After finding the right people through socially aware expert finder and recommender systems she starts to collaborate with them using a number of communication feathers such as: private group space, forums, emails.

She continues her tour exploration of Learning Network space to invite other experts to see what could be the reaction of others about this idea and to refine the idea would be the most appropriate in this domain.

User scenario 3: Seek Peer advice

Alexander, from Germany is finishing his Bachelors and is looking for a PhD programme in Comparative Literature. He has read a lot of information about available programmes that he could get on line. He has also realized that despite the power of search tools like Google, he has a hard time finding interesting and alternative pathways (e.g. programme in another country, part time options, dividing the programme between two cities, fellowships, etc) because he is limited to his own knowledge and understanding of the process. Additionally, he would like to know what the experiences of students are within particular programmes (as this information is often missing from programme brochures) and to see if he would fit in. He decides to express his needs in TENCompetence.

John is a current PhD student in comparative literature in Paris who happens to be in touch with Alexander through the TENCompetence learning network. He has developed a relationship with John through previous interactions and trusts his opinions. John tells Alexander of his learning goals, his current status as a student in Paris, what he likes, what he doesn't like about it, the application process, etc. Through the course of their conversation, it emerges that there is an interesting programme at Notre Dame which provides a flexible curricular framework in which one may design a more individualized, cross-disciplinary course of study. Additionally, the fellowships are quite generous, though competitive. John has a friend there and he can pass him Alexander's information, if Alexander is interested in Notre Dame. Following the interaction with John, Alexander may decide to follow his advice or explore the experiences and practices of other peers within the network for a more detailed search.

User scenario 4: Seek Expert Advice

Fred is interested in the field of digital cinema and wants to know how he can go about becoming a cameraman. He has already done research on his own on the general process for becoming a certified cameraman and qualifications needed, but he is unable to distinguish one programme from another. He would rather get an idea of the experience other cameramen and is in search of their expertise and recommendations on what the best route/programmes to take. Within the TENCompetence Learning Network, he uses the Expert Finder to locate experts related to the audiovisual area. The Expert Finder supports the identification of experts within a well-defined field based on information from the learner profile and the specificity of the query (ranging from something general such as “digital cinema” to more specific such as “audiovisual certification”). Fred explores the results, of the different experts and their profiles and may also look at the ratings of experts by other users. He may also query the most popular experts in this field. After exploring the profiles, Fred contacts those who seem interesting to him.

User Scenario 5: Identify relevant individuals for the creation of a project team

Jack is a manager of an international company who has been tasked to create a team to lead a new division in another city. He would like to find out what the key roles are as well as the competences that are needed to drive a new project. Once he has mapped these requirements to the existing competences of his staff, he can then identify what other training is necessary to prepare the team for work in the new division.

User Scenario 6: Learning by playing (Part 1)

Stephen is a new to the TENCompetence Learning Network. His first entry into the system is directed mainly toward the discovery of the network space, its features and to identify what may be interesting for him. He notices an invitation to a simulation for new users and reads an explanation that the simulation is designed to enable users to better navigate the TENCompetence learning networks. Stephen decides to “play” this game. Stephen enters the TENCompetence Learning Network webpage. He notices on the side menu an invitation to play the TENCompetence Learning Network game for new users. The game is designed to provide new users with a simulated experience of a learning network and its various navigation and communication tools. First Stephen is given a brief description of the simulation and its purpose.

He may then choose a simulated experience in one of the following contexts:

- Organizational LNs
- Inter-organizational LNs
- Domain-specific LN
- Educational LNs
- Community LNs

He chooses Domain LN and is directed to the LN on Digital Cinema (fields may be broadened over time) and given a mission. The missions may vary, one of which could be:

“You are a film director and you want to put together a team to work on a new movie. Your objective is to select from the Digital Cinema Learning Network three key individuals, a writer, a director of photography and an editor with whom to work with.”

Stephen will have at his disposal different communication and information/ people visualization tools within the system as well as feedback and recommendations based on user actions and choices.

If more than one user has selected the simulation, they will be asked to work together in teams. This will facilitate group learning and collaboration, and provide added-value to user-system interaction.

Stephen and his team enter the simulated learning network. They proceed to explore the space and use different features with feedback and recommendations given as the team progresses. Through the course of the simulation, they may experience the following system features:

- *Visualize job positions and competences within a field*
- *Visualize individuals, their job position, CV and competences*
- *Communicate with selected individuals (through the use of different communication tools)*

Based on team decisions and actions, agents will intervene with feedback and suggestions.

User Scenario 7: Learning by playing game (Part 2)

Sally, an IT with a bank, is fed up with her job and is contemplating a career change. She has always been interested in the area of animation and this could be a possible avenue to pursue. She is savvy with the computer and design software but has no idea what a career in animation would entail. Furthermore, she does not know anyone in this field and decides to use the TENCompetence Learning Network as a starting point. Sally enters the Learning Network and is at a loss as to how to proceed. Her goals are as yet undefined and she is interested mainly in a general exploration of the field. She would like to explore the TENCompetence space and its features and to identify what would be interesting for her. She notices an invitation to a simulation for new users and explanation that the simulation is designed to familiarize new members like her to the platform and its features. The objective is to enable users to better navigate the TENCompetence learning networks.

Sally decides to “play” this game.

Sarah enters the TENCompetence Learning Network webpage. She notices on the side menu an invitation to play the TENCompetence Learning Network game for new users. The game is designed to provide new users with a simulated experience of a learning network and its various navigation and communication tools.

First Sally is given a brief description of the game and its context. She will be placed in a simulated learning network in digital cinema (fields may be broadened over time) and be given a mission. This mission could be:

“You are a first assistant cameraman who is interested in becoming director of photography. You have some qualifications but not others. Existing qualifications may be viewed in the user portfolio. Your objective is to find the remaining relevant programmes and certifications that will enable you to apply for DOP positions. You are part of the TENCompetence Learning Network in Digital Cinema and would like to use its resources (in terms of people and programmes) to achieve your objective.”

Users will have at their disposal different communication and information/ people visualization tools within the system as well as feedback and recommendations based on user actions and choices.

Sally enters the simulated learning network. She proceeds to explore the space and use different features with feedback and recommendations given as the team progresses. Through the course of the simulation, she may experience different features of the platform such as:

- *Creating a personal profile/portfolio*
- *Exploring job positions within a field and required competences*
- *Visualizing job positions and competences*
- *Searching and visualizing different competence development programmes*
- *Visualizing peer and expert network*
- *Communicating with peers and experts (use of different communication tools)*
- *Knowledge exchange- initiating and responding to conversations and discussions*
- *Rating quality of interaction, contribution, learning network (Slashdot)*
- *Creating subgroups or new communities*
- *Knowledge creation- creating and publishing content (working with a wikis)*

User Scenario 8: Joint creation of knowledge through Wikis

A group of users communicate and exchange ideas through the TENCompetence LN forum on medical techniques and courses. Dr. Uzan, who originated the forum, serves as moderator of the discussions. Philippe is a physician who is fairly new to the TENCompetence Learning Network and has been monitoring the discussions within this forum. To date, he has not contributed to the discussion. However, at one point, he has an idea and finds it relevant to participate. He wants to suggest that the group works together with a wiki on creating a document detailing the different methods and training courses available. This will serve as a summary of the ongoing discussions and a reference other users may easily access.

Philippe enters the TENCompetence learning network. He logs in and is directed to the appropriate LN. He browses through the new postings after which he selects the posts he has been monitoring. One of these relates to medical techniques and courses on these techniques. As he looks at the latest posting, he realizes that what's missing is easy access to the key points and discoveries made through the course of the discussions. A user new to the forum would have to backtrack and reread all the postings. He decides to make a

suggestion. He adds a new post and suggests a joint creation of a document on a summary of discussion findings and key issues identified.

Dr. Uzan, the moderator, responds with an agreement. She agrees to add a wiki function so that members may start contributing to the document on medical techniques programmes. She also asks other users for their opinion and willingness to engage in this task (through a poll).

Responses from other members are generally in favor of the proposition.

Dr. Uzan adds a wiki function to the Learning Network space and sets up a basic document structure.

Dr. Uzan sends a message through the forum describing the objectives of the document and invites forum subscribers to contribute to its development.

User Scenario 9: Social Bookmarking: Bottom-up organization of content and knowledge

Taken from <http://www.educause.edu/ir/library/pdf/ELI7001.pdf>

Professor Smith does much of his work on the Web these days. When he is not teaching or doing primary research, he spends time on the Web looking for information related to his area of expertise. Dr. Smith gets his information from many sources; he receives email newsletters from professional organizations and colleagues, he subscribes to several dozen RSS newsfeeds, and he uses search engines to help uncover resources that may be of value in his teaching and research.

He uses folders in his Web browser to organize bookmarks of online resources, but this practice has become inefficient. If a resource is relevant to several topic areas, he has to save the bookmark in multiple folders. At times he will discover that his essential bookmarks are on his home machine while he is at the office. Other times he is fairly confident that the bookmarked site is on his machine but the process of finding one site out of hundreds of bookmarks is more difficult than refinding it using Google. Often Dr. Smith needs to share bookmarks with students and colleagues: this task requires finding the reference and emailing it.

Dr. Brown has all of the same needs as Dr. Smith but uses del.icio.us to manage her bookmarks. When Dr. Brown finds a Web site to bookmark, she "right-clicks" the site to add it to her del.icio.us account and "tags" it with a few relevant keywords. Since her list is public, she can easily direct colleagues and students to it. Others can find the list through the keywords. Dr. Brown has a few other advantages as well. When she bookmarks a site, del.icio.us tells her how many others bookmarked the same site. If she clicks on that number, she can see exactly who else bookmarked the site and when they found it. A further click shows her the bookmark collections of others interested in "her" site. Finally, if she chooses a common tag, Dr. Brown can see all of the other sites with that tag. This makes group collection and aggregation of bookmarks very easy.

Dr. Brown has broken from the model of using private folders to organize information. Social bookmarking creates a true web of resources and connections- one that is not limited to individuals and their folders but represents the interests and judgements of a community of users.

With regard to TENCompetence, experts contribute knowledge on the developments in a field and the new competences that are emerging as the profession evolves. This knowledge is tagged by experts themselves to facilitate future retrieval (c.f. del.icio.us). Additionally other users querying the subject may be able to see the popularity of the subject (c.f. Flickr).

Anecdotal evidence (see Jon Udell's screencast on del.icio.us) supports the view that there is a natural tendency towards the convergence of tags. Strategies to facilitate this development are also possible. In a blog entry entitled 'Folksonomies: How we can improve the tags', Lars Pind has suggested various possibilities including the following: a) 'suggest tags for me', b) 'find synonyms automatically', c) 'help me use the same tags others use', d) 'infer hierarchy from the tags', and e) 'make it easy to adjust tags on old content'. Currently only option e) appears to be in common use, presumably because it is the easiest to implement.